

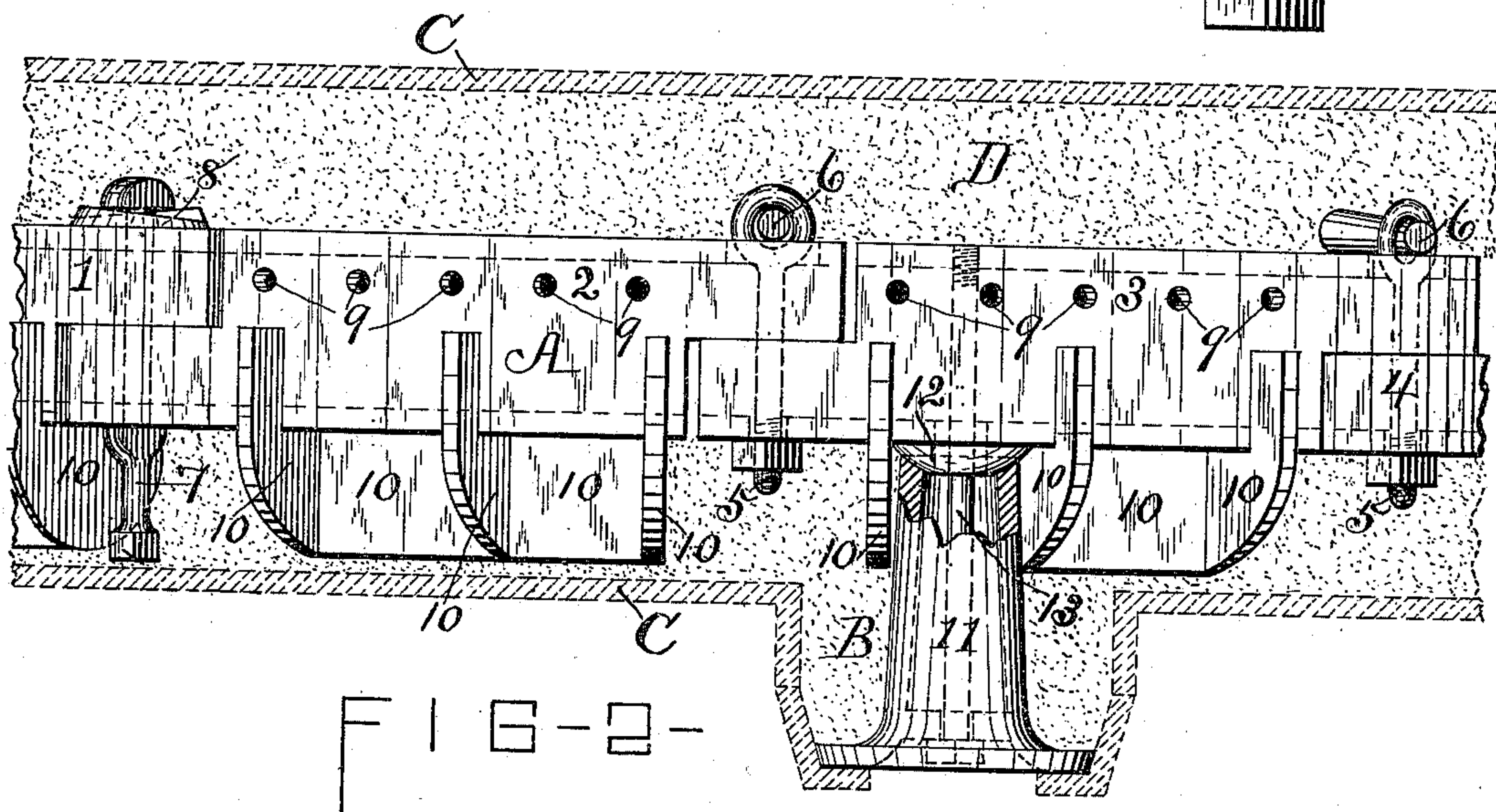
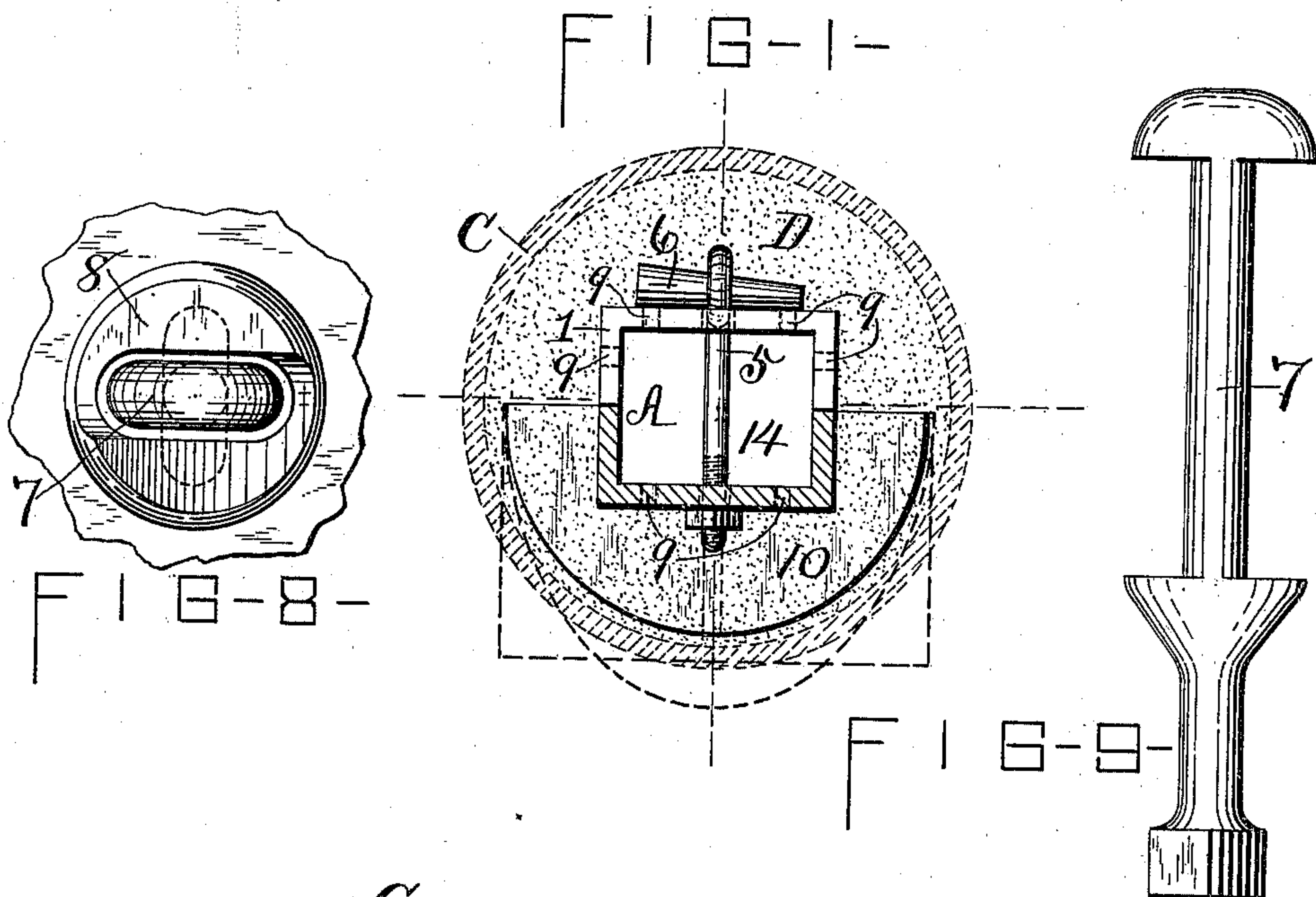
(No Model.)

2 Sheets—Sheet 1.

W. E. WARNER & F. A. AUSTIN.  
CORE ARBOR FOR HOLLOW CASTINGS.

No. 383,603.

Patented May 29, 1888.



Witnesses—

*Morgan & Dunn*  
*Parker & Wacker*

Inventors—  
*Warren E. Warner*  
*and Frank A. Austin*  
By their Attorney,  
*Wm. C. Raymond*



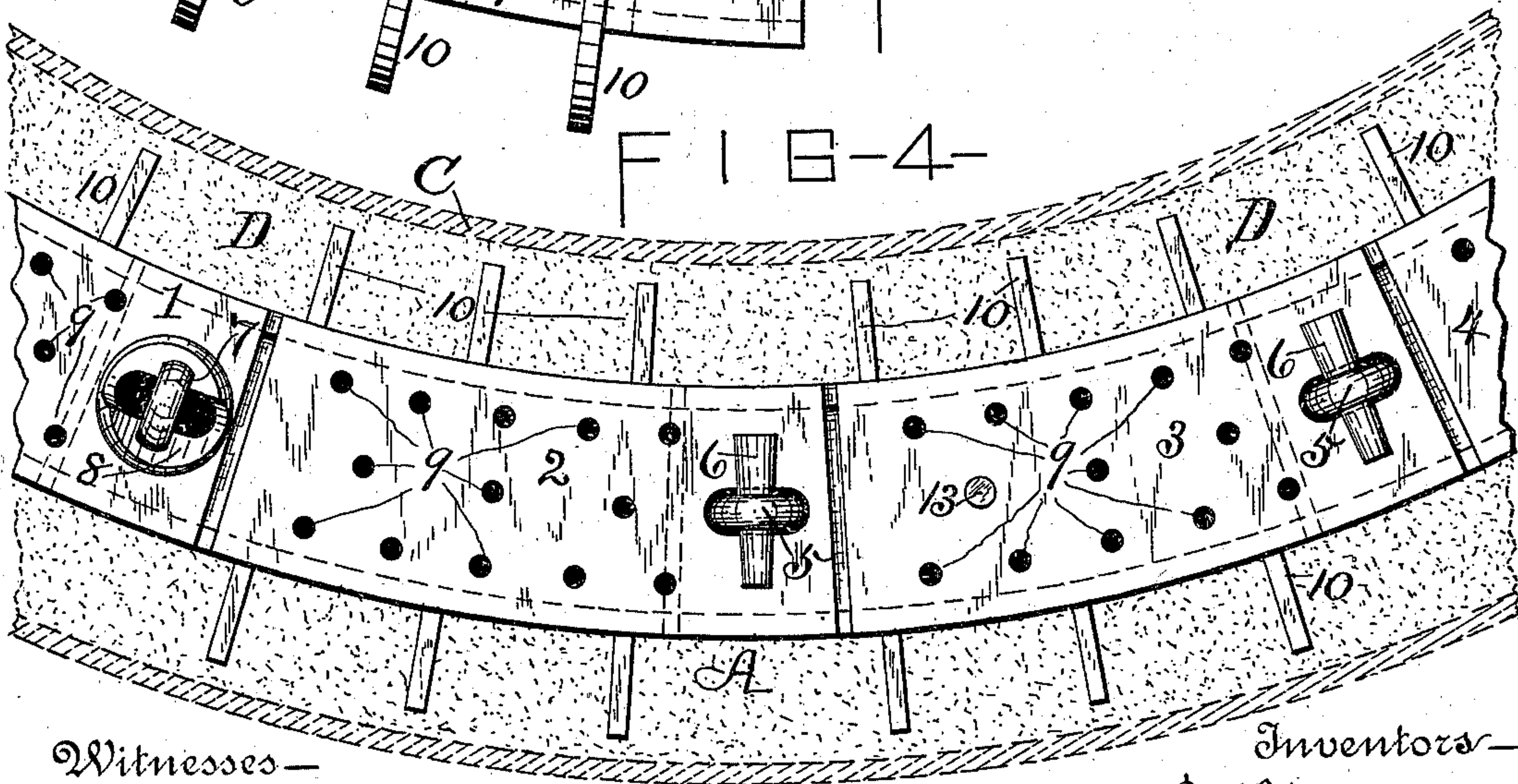
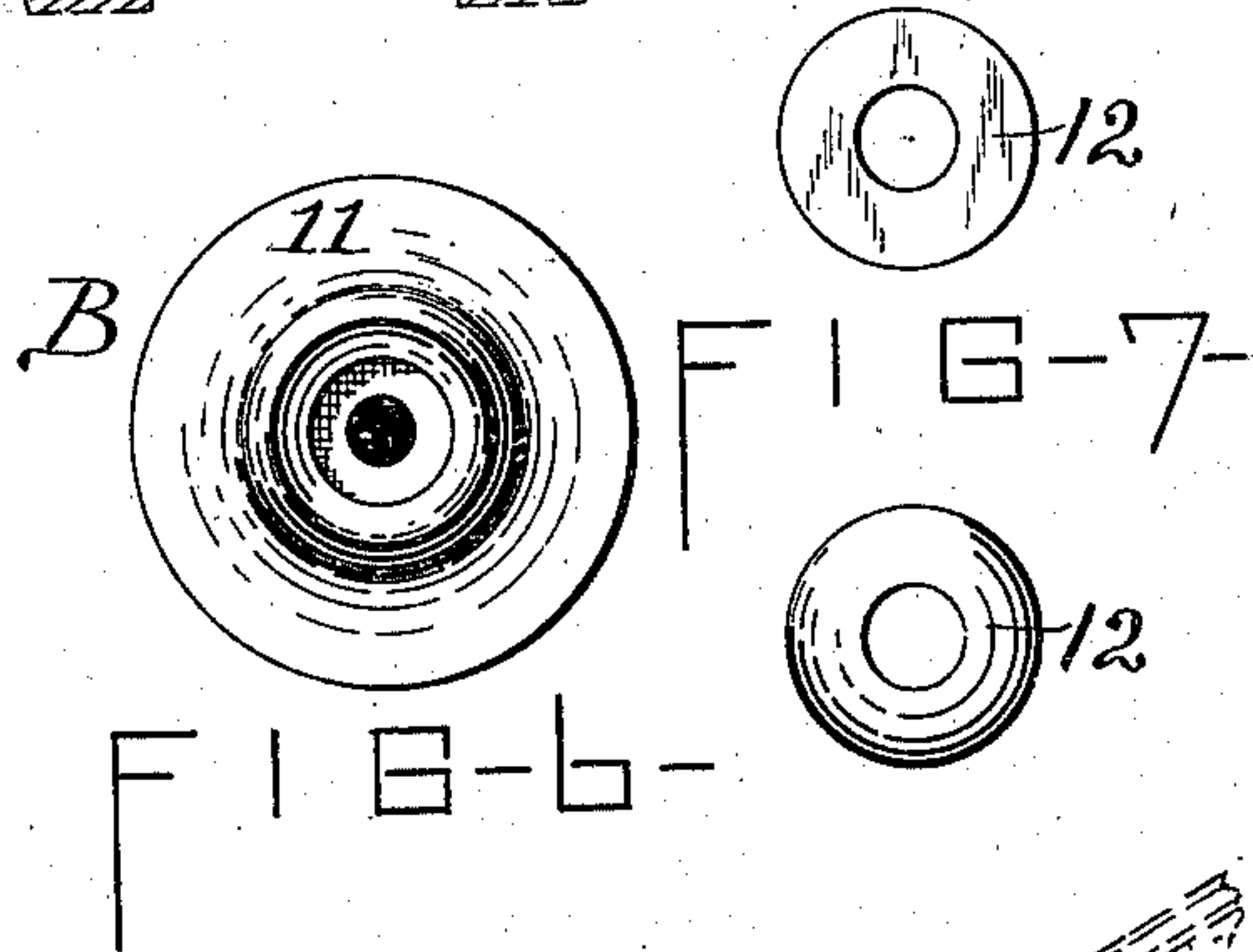
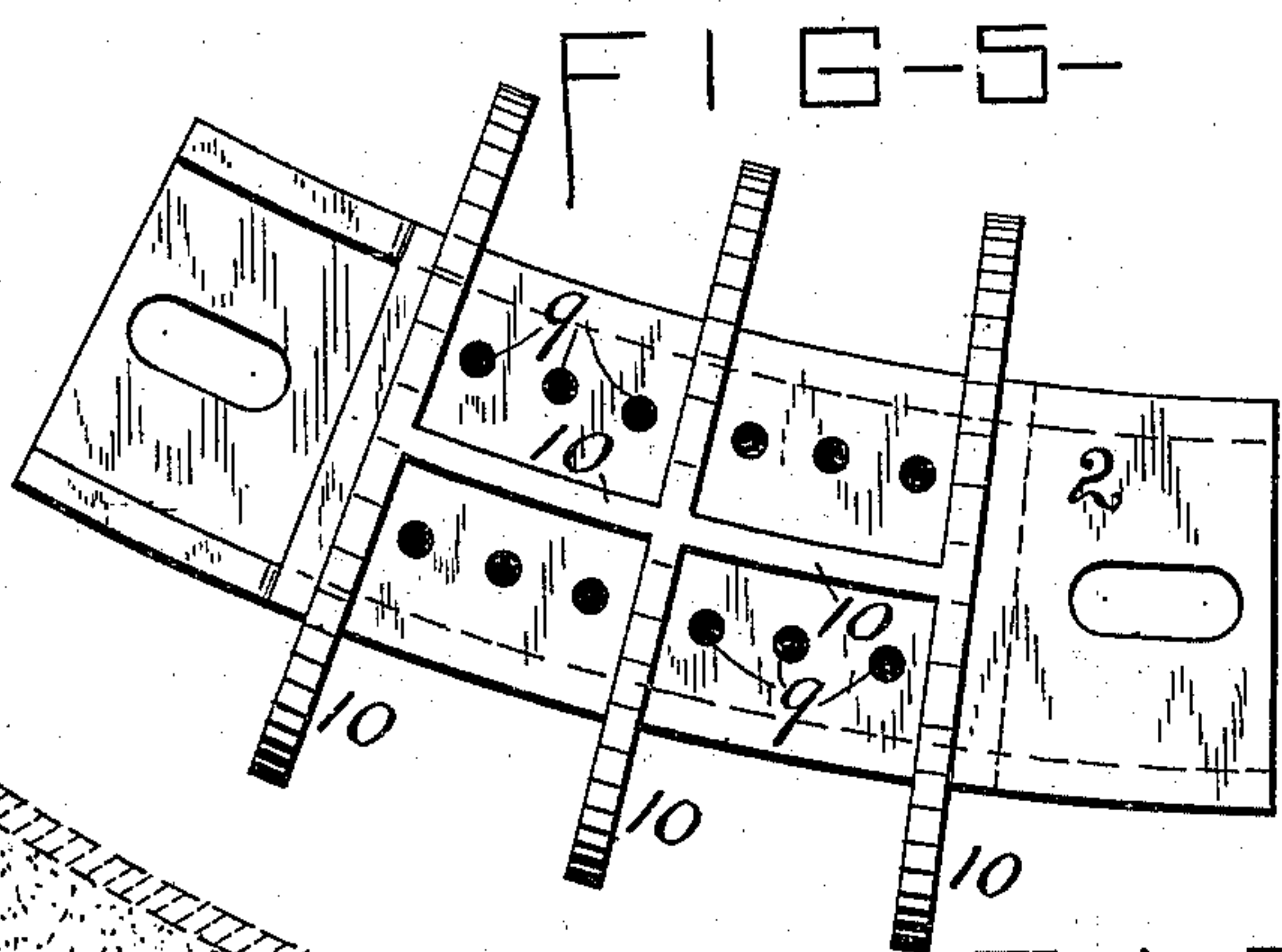
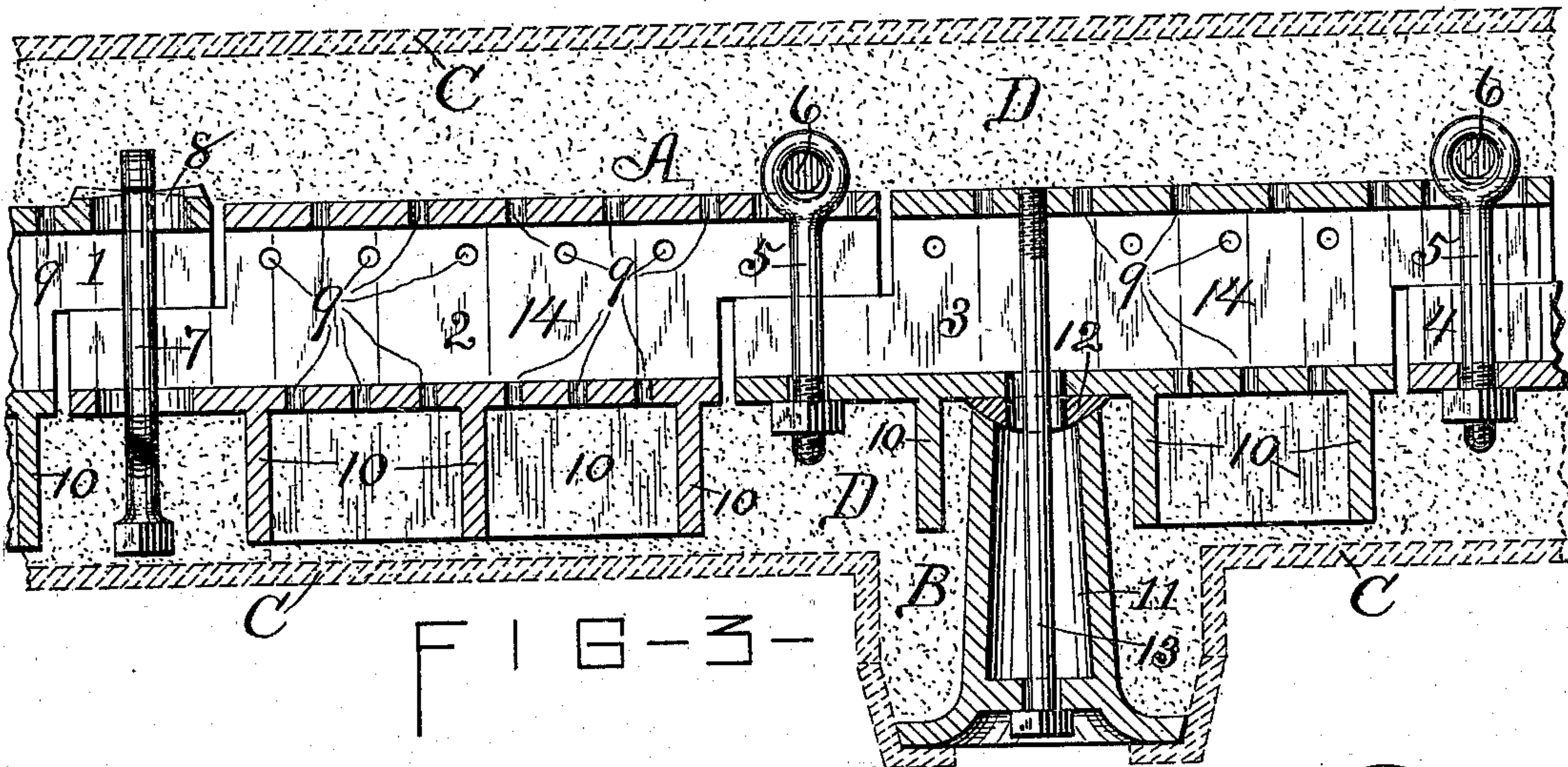
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*Morgan A. Dunn*  
*Parker M. Vicks*

Inventors—

*Warner, E. Warner,*  
*and Frank A. Austin,*  
By their Attorney,  
*Genl. C. Raymond.*



# UNITED STATES PATENT OFFICE.

WARREN E. WARNER AND FRANK A. AUSTIN, OF SYRACUSE, NEW YORK,  
ASSIGNORS TO THE J. F. PEASE FURNACE COMPANY, OF SAME PLACE.

## CORE-ARBOR FOR HOLLOW CASTINGS.

SPECIFICATION forming part of Letters Patent No. 383,603, dated May 29, 1888.

Application filed November 3, 1887. Serial No. 254,155. (No model.)

*To all whom it may concern:*

Be it known that we, WARREN E. WARNER and FRANK A. AUSTIN, respectively of Syracuse, county of Onondaga, in the State of New York, and citizens of the United States, have invented certain new and useful Improvements in Core-Arbors for Hollow Castings, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a transverse section of our core-arbor; Fig. 2, a front elevation thereof; Fig. 3, a longitudinal section; Fig. 4, a top plan view; Fig. 5, a bottom plan view of a detached section; Fig. 6, a top plan view of standard detached; Fig. 7, top and bottom detail views of the rounded or ball projection; Fig. 8, an enlarged detail of the cam or screw fastener; and Fig. 9, a detail, enlarged, of the bolt that operates therein.

Similar letters and figures of reference indicate corresponding parts throughout the several views.

Our invention relates, generally, to cores for making hollow castings; and our object is to produce a core ready for use without previous baking, using only wet sand and a sectional core-arbor within the sand.

Our invention consists in the several novel features of construction hereinafter described, and which are specifically enumerated in the several claims hereunto annexed.

It is constructed as follows:

A is the core-arbor, made in hollow sections 12 34, &c., preferably of rectangular form in cross-section, the meeting ends of which are adapted to fit together, as shown—i. e., the central horizontal faces of the meeting ends of the adjacent sections being in close contact and unyielding vertically and a suitable space or opening formed between the vertical faces of said meeting ends, whereby the expansion of the parts under heat is amply provided for. These sections are secured together at said meeting ends, preferably by a key-bolt, 5, inserted through an oblong hole at the top of and a circular hole at the bottom of the arbor, and a locking-wedge, 6, passing through the eye of the protruding head of the key-bolt, about as shown; or we can secure the sections by a bolt,

7, the head of which engages with an inclined or cam surface, 8, on top of the sections, as is clearly illustrated in the drawings. We form these sections hollow, both for lightness and also for ventilation of the casting, and 9 9 are perforations through the shell of the sections. We also provide the sections with longitudinal and transverse or circumferential ribs or flanges 10, which support the sand when packed between and over them.

B is a bearing to be used to adjust the level of the core (or core-arbor) in the core-box and support it, said bearing consisting of a hollow standard, 11, provided with a socket-top fitting the fixed or loose rounded or ball projection 12, beneath the core-arbor section, (thus constituting a ball-joint,) and an adjustable bolt, 13, passing up through the standard, the ball, and the section, as illustrated in the drawings.

C is a casting, with the core-arbor and core within it; and D represents the formed sand, said parts being shown in the drawings by dotted lines and dotted work.

In our employment of the key-bolt 5 for securing the sections together we insert it from the top into and through the apertures or holes, then screw the nut up against the arbor-section, (the wedge already being loosely inserted through the eye of the bolt-head,) and with any proper tool drive the wedge forward in the eye of the bolt until the respective sections are made or held perfectly rigid or immovable vertically, yet at the same time allowing for the longitudinal or circumferential expansion of the sections under heat by reason of the vertical openings left between the vertical faces of the meeting ends. The aforesaid features of construction adapted to properly connect the respective sections together are, as may readily be observed, of vital importance in insuring perfect castings.

Our device is operated as follows: We properly secure the arbor-sections together by means of the bolts, place them in the core-box, ram in the moist sand firmly, and remove the formed core from the box, and place it in the mold or flask without any baking in an oven. When the casting is made and sufficiently



cooled, it is taken from the mold and suitably suspended, when a little rapping thereon will loosen the sand, which will come out of the opening or openings in the casting left for that purpose, and then through said opening or openings we uncouple and remove the core-arbor sections, shifting the arbor along in the casting until the bolts are reached.

In uncoupling the sections the fastening device 5 6 can be manipulated from either top or side, and that marked 7 8 from either the side, top, or bottom.

Such a green-sand core will retain its exact shape and not warp, no core-oven is necessary, and no sand is wasted, as it can be used over and over again by wetting it. Neither do we need or use any flour or other ingredients used in the making of baked cores; also, the perforations in the sections permit the gas and steam to pass into the central chamber, 14, wherein it will pass around to and through an outlet from the mold. By the employment of our core-arbor (or core) hollow castings of any desired form can be made, whether circular, serpentine, angular, or straight. Moreover, our invention is applicable to castings that are oval or square, as well as round, in cross-section, by simply varying the shape of the transverse ribs of a core-arbor section correspondingly, as illustrated by dotted lines in Fig. 1 of the drawings.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

35 1. A core-arbor consisting of removably-connected hollow sections provided at their meeting ends with an overlapping part adapted to come in horizontal meeting contact with an adjacent overlapping part, and with a suitable  
40 space left between the adjacent upper and lower vertical faces of the meeting sections to permit of longitudinal expansion under heat, substantially as described.

2. In a core arbor, in combination, two or more rectangular hollow sections provided at 45 their meeting ends with an overlapping part that comes in horizontal meeting contact with an adjacent overlapping part, and provided with an open space between their adjacent upper and lower vertical faces, and a key-bolt 50 provided with a wedge inserted through the eye of its head, passing through perforations formed in the overlapping parts of the aforesaid meeting ends, said connections being adapted to secure the sections together un- 55 yieldingly vertically, and yet allow for their longitudinal expansion under heat, substantially as described.

3. A hollow core-arbor section of rectangular form in cross-section, with perforations in 60 its shell, and constructed with an upper horizontally-projecting portion provided with an oblong aperture at one end and a lower horizontally-projecting portion provided with a circular aperture at its opposite end, and pro- 65 vided with a central longitudinal rib and transverse intercepting ribs upon its lower exterior surface, in combination, substantially as described.

4. A core-arbor consisting of sections bolted 70 together and mounted upon and connected to a supporting-standard by a ball-joint, substantially as described.

5. A core-arbor mounted upon and connected to a supporting-standard by a ball-joint, sub- 75 stantially as described.

In witness whereof we have hereunto set our hands this 14th day of October, 1887.

WARREN E. WARNER. [L. S.]  
FRANK A. AUSTIN. [L. S.]

In presence of—

WM. E. RAYMOND,  
WM. BOON.