

Nov. 1, 1949

J. J. NOLAN, JR

2,486,870

COLLAPSIBLE CORE FOR CENTRIFUGAL PIPE MOLDS

Filed Oct. 10, 1946

3 Sheets-Sheet 1

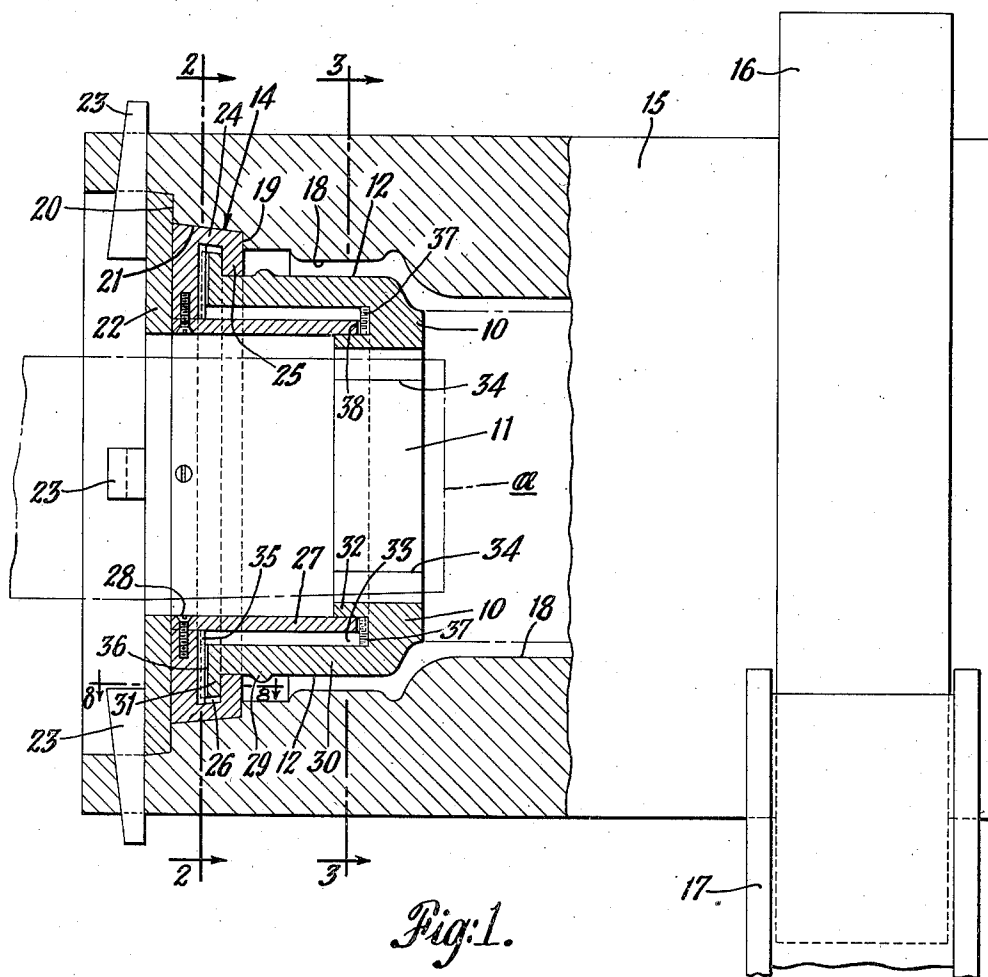


Fig. 1.

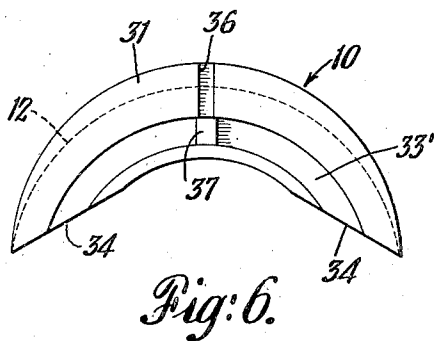


Fig. 6.

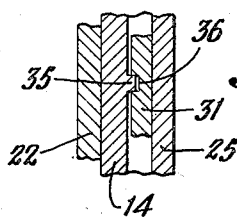


Fig. 8.

INVENTOR.  
JOHN J. NOLAN JR.  
BY  
Donald W. Robertson  
ATTORNEY

Nov. 1, 1949

J. J. NOLAN, JR

2,486,870

COLLAPSIBLE CORE FOR CENTRIFUGAL PIPE MOLDS

Filed Oct. 10, 1946

3 Sheets-Sheet 2

*Fig. 2.*

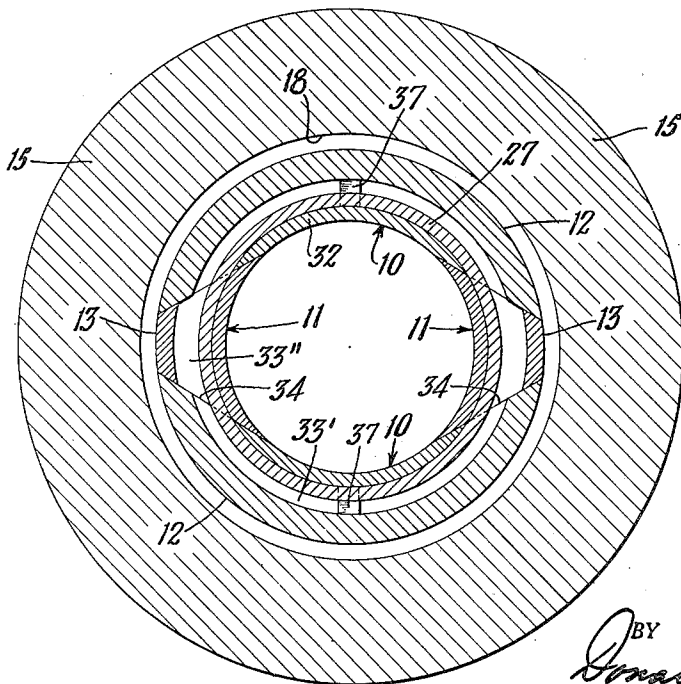
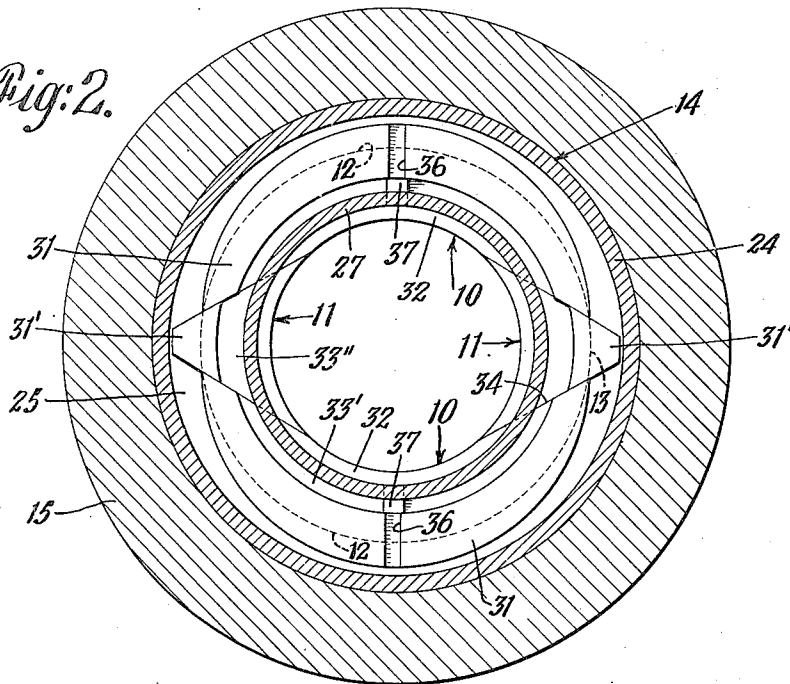


*Fig. 3.*

INVENTOR.  
JOHN J. NOLAN JR

BY  
*Donald W. Robertson*  
ATTORNEY

**Nov. 1, 1949**

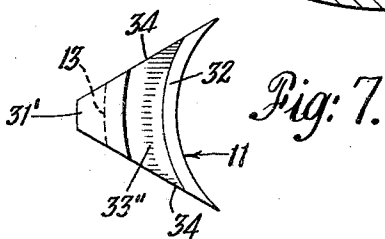
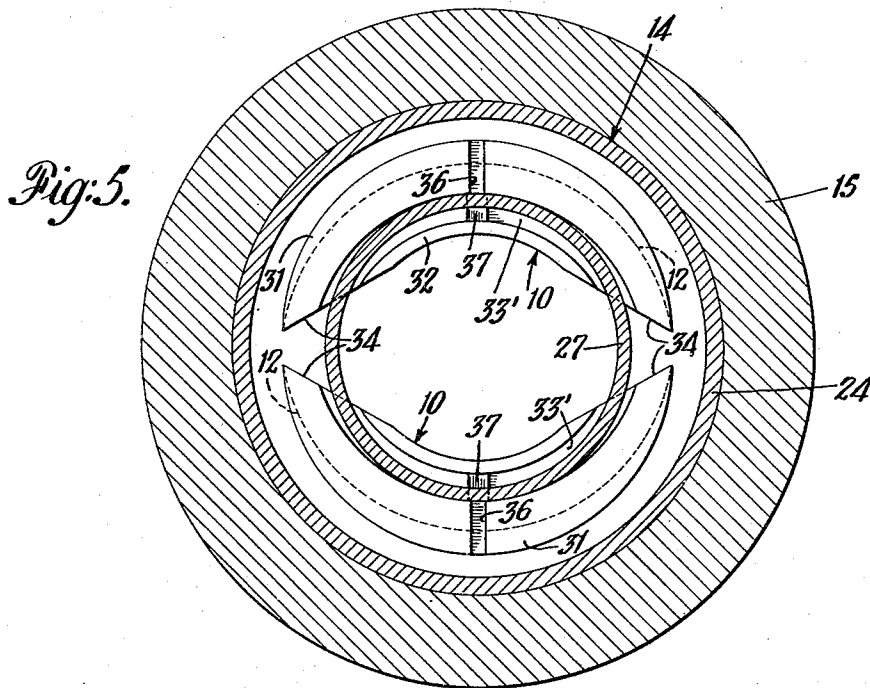
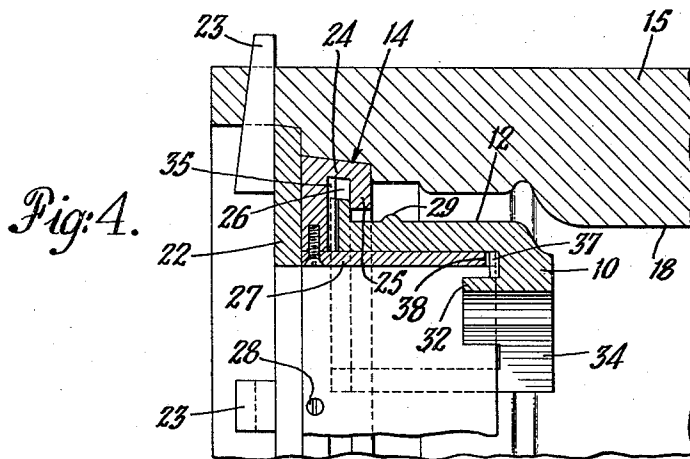
J. J. NOLAN, JR

**2,486,870**

# COLLAPSIBLE CORE FOR CENTRIFUGAL PIPE MOLDS

Filed Oct. 10, 1946

3 Sheets-Sheet 3



INVENTOR  
JOHN J. NOLAN, JR.  
BY  
Donald W. Robertson  
ATTORNEY

## UNITED STATES PATENT OFFICE

2,486,870

COLLAPSIBLE CORE FOR CENTRIFUGAL  
PIPE MOLDS

John J. Nolan, Jr., New York, N. Y., assignor to  
The Central Foundry Company, New York,  
N. Y., a corporation of Maine

Application October 10, 1946, Serial No. 702,470

9 Claims. (Cl. 22—166)

1

The invention relates to collapsible cores for centrifugal pipe molds, particularly to permanent cores of metal or other material susceptible of re-use.

In forming the bell ends of cast iron pipe and the like, it is necessary to employ either a destructible core such as a baked or dry sand core, or a permanent core made in a series of segments which can be collapsed or separately removed so as to clear the groove on the inside of the bell. In the case of the destructible core, it is necessary to make a new core for each casting. To avoid this, segmental metal cores have been devised. However, the devices of this type which have been known or used heretofore have been of rather complicated construction or difficult to manipulate, involving the use of pivoted segments, cams, etc., and these or other disadvantages of such devices have restricted their usefulness.

It is an object of my invention to provide an improved collapsible core of simplified construction which is easy to manipulate and which forms a unitary assembly without the use of pivots or cams. Other objects and advantages of my invention will appear as the description proceeds.

In the drawings:

Fig. 1 is a central vertical longitudinal sectional view of a preferred embodiment of the invention, illustrating its application to a metal pipe mold for forming the inner surface of a bell end. The core segments are shown in their expanded, or casting, position.

Figs. 2 and 3 are transverse sectional views taken as indicated at 2—2 and 3—3, respectively, in Fig. 1.

Fig. 4 is a detail sectional view similar to a portion of Fig. 1, but showing the core segments in retracted, or collapsed position for removal of the core at the conclusion of a casting operation.

Fig. 5 is a transverse sectional view similar to Fig. 2, but showing the core segments in the collapsed position, corresponding in this respect to Fig. 4.

Figs. 6 and 7 are detail face views of larger and smaller core segments, respectively.

Fig. 8 is a detail sectional view taken on the line 8—8 of Fig. 1, showing one of the guiding arrangements between the radially movable segments and the retaining ring.

The invention consists, in its general arrangement, of a collapsible core comprising a series of core segments 10 and 11, the outer surfaces 12 and 13 of which form an inner pipe surface, and a retaining ring 14 arranged for engage-

2

ment with the core segments to hold them in loosely assembled relationship for limited movement in a radial direction. In the preferred arrangement illustrated, the collapsible core fits into the bell end of a metal pipe mold 15 mounted for rotation about its axis for centrifugal casting as by means of suitable metal tires supported on pairs of flanged rollers motor driven to rotate the mold. The means for producing rotation of the mold is not a part of the present invention and conventional mechanism known to the art may be employed for this purpose. However, for illustration I have shown one of the tires 16 and one pair of flanged rollers 17 on which the mold is supported for rotation.

The end of mold 15 is suitably contoured to produce surfaces 18 which form the outer surface of the pipe bell. Annular shoulders 19 and 20 near the inside end of the mold, with the connecting coniform surface 21, serve to position retaining ring 14 and locking plate 22 for holding the collapsible core in casting position. The outer periphery of the retaining ring is tapered to fit the mold surface 21. Locking plate 22 is held in place by suitable fastening means such as wedges 23 driven into slots in the mold as shown. During casting, rotation of the mold causes these wedges to hold tight under the action of centrifugal force.

Retaining ring 14 comprises two elements arranged to be secured together to lock the core segments 10 and 11 in loosely assembled relationship thereto. The outer element comprises an axially extending annular section 24 terminating in an inwardly directed radially extending flange 25 forming an annular groove 26. The inner element comprises a cylindrical annulus 27 fixed to the outer element, as by screws 28 or otherwise, to lock the core segments in assembled relationship.

Core segments 10 and 11 can be formed with projections on their outer surfaces 12 and 13 which together form an annular ridge or bead 29 for producing a groove on the inside of the pipe bell. The core segments together form an annular assembly having a generally cylindrical portion 30 with an outwardly directed radially extending flange 31, 31' for engagement with the annular groove 26 of the retaining ring, and an axially extending flange 32 forming an annular groove 33 to receive the end of the cylindrical portion 27 of the retaining ring. The annular core assembly is divided into a number of separate core elements along engaging surfaces 34 (Fig. 3) disposed at an acute angle to a plane

3

containing the axis of the pipe surface or mold. These engaging surfaces 34 of the series of core segments are further arranged so that they form a re-entrant angle on two of the segments. In the series of four core segments illustrated, segments 10 are formed with re-entrant angles as clearly shown in Fig. 6.

The width of the annular groove 33 in core segments 11 is greater than it is in core segments 10, as shown in Figs. 6 and 7 at 33' and 33'', respectively. Thus the radial movement of the several segments is limited to different extents. Specifically, the radial movement of the two segments 10 having the re-entrant angles is limited to confine their movement to a shorter radial distance than the remaining segments 11 can move.

The core segments and retaining ring have complementary radially disposed surfaces for guiding the core segments. Thus, in the specific embodiment illustrated, the annular groove 26 has guide means in the form of radially disposed ribs 35 for cooperation with grooves 33 in the core segments to maintain their relative peripheral disposition during radial movement. Also, I prefer to employ additional guide means at the inner end of the core assembly, such as provided by the ribs 37 at the base of the annular groove 33, and cooperating grooves 38 in the ends of cylindrical ring element 27.

In Figs. 1, 2 and 3 the core segments are shown in their expanded, or casting position. During casting they are held in this position by the action of centrifugal force. In Figs. 4 and 5 the core segments are shown in retracted, or collapsed position for removal of the core at the conclusion of a casting operation. It will be observed that in this position the core segments clear the groove formed by the rib 29 in the inside of the bell of the pipe casting. This is accomplished without the use of pivots, cams, or other complicated arrangements resorted to heretofore for the accomplishment of similar purposes.

It will be observed from Figs. 2 and 6 that the flanges 31 of core segments 10 are highest at their central portion, tapering down at the ends. This allows for initial assembly of the segments with the retaining ring. However, if desired, the ring may be split into two semi-circular segments for assembly, in which case the flanges 31 may be of the same height throughout. The split ring is welded together after assembly of the core segments therewith. In assembling the core illustrated in the drawings, the core segments 10 are hooked into the groove 26 of retaining ring section 24 and separated to the maximum extent. Then core segments 11 are inserted so as to engage the groove 26 of ring section 24. Next the cylindrical annulus 27 is put in place and secured to ring section 24, completing the assembly.

A suitable charging trough is indicated at *a* in Fig. 1.

The terms and expressions which I have employed are used in a descriptive and not a limiting sense, and I have no intention of excluding such equivalents of the invention described, or of portions thereof, as fall within the purview of the claims.

I claim:

1. A unitary collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and a retaining ring arranged for engagement with the core segments, the retaining ring and core segments having interlocked flanges and grooves with clear-

4

ances between said projections and grooves or recesses to hold the core segments in loosely assembled relationship for limited movement in a true radial direction with relation to the mold.

2. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and a retaining ring arranged for engagement with the core segments, the retaining ring and core segments having interlocked flanges and grooves with clearances between said projections and grooves or recesses to hold the core segments in loosely assembled relationship for limited movement in a true radial direction with relation to the mold, the core segments and retaining ring having complementary radially disposed surfaces for guiding the core segments.

3. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and a retaining ring arranged for engagement with the core segments, the core segments and retaining ring having complementary radially extending flanges and complementary axially extending flanges, said complementary radially and axially extending flanges being loosely interlocked to hold the segments in loosely assembled relationship for limited movement in a radial direction.

4. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and a retaining ring arranged for engagement with the core segments, the core segments and retaining ring having complementary radially extending flanges and complementary axially extending flanges to hold the segments in loosely assembled relationship for limited movement in a radial direction, the radially extending flange of the retaining ring forming an annular groove for sliding engagement with the radially extending flanges of the core segments.

5. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and a retaining ring arranged for engagement with the core segments, the core segments and retaining ring having complementary radially extending flanges and complementary axially extending flanges to hold the segments in loosely assembled relationship for limited movement in a radial direction, the radially extending flange of the retaining ring forming an annular groove for sliding engagement with the radially extending flanges of the core segments, and the annular groove having radial guide means for cooperation with the core segments to maintain their relative peripheral disposition during said limited radial movement.

6. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and an annular retaining ring arranged for engagement with the core segments, the retaining ring having an axially extending annular section terminating in an inwardly directed radially extending flange forming an annular groove, the core segments having outwardly directed radially extending flanges for engagement with said annular groove to hold the core segments in loosely assembled relationship for movement confined substantially to a radial direction.

7. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and an annular retaining ring arranged for engagement with the core segments, the retaining ring having an axially extending annular section terminating in an inwardly di-

5

rected radially extending flange forming an annular groove, the core segments having outwardly directed radially extending flanges for engagement with said annular groove to hold the core segments in loosely assembled relationship for movement confined substantially to a radial direction, and the retaining ring having a cylindrical portion fixed in a position to lock the core segments in said assembled relationship.

8. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and an annular retaining ring arranged for engagement with the core segments, the retaining ring having an axially extending annular section terminating in an inwardly directed radially extending flange forming an annular groove, the core segments having outwardly directed radially extending flanges for engagement with said annular groove to hold the core segments in loosely assembled relationship for movement confined substantially to a radial direction, and the retaining ring having a cylindrical portion fixed in a position to lock the core segments in said assembled relationship, the core segments having axially extending flanges forming in their assembled relationship an annular groove to receive the end of the cylindrical portion of the retaining ring.

9. A collapsible core for a centrifugal pipe mold comprising a series of core segments forming an inner pipe surface, and an annular retaining ring arranged for engagement with the core segments, the retaining ring having an axially extending annular section terminating in an inwardly di-

6

rected radially extending flange forming an annular groove, the core segments having outwardly directed radially extending flanges for engagement with said annular groove to hold the core segments in loosely assembled relationship for movement confined substantially to a radial direction, and the retaining ring having a cylindrical portion fixed in a position to lock the core segments in said assembled relationship, the core segments having axially extending flanges forming in their assembled relationship an annular groove to receive the end of the cylindrical portion of the retaining ring, the width of the groove in at least one of the core segments being greater than the width of the groove in other core segments whereby the radial movement of the segments is limited to different extents.

JOHN J. NOLAN, JR.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name    | Date          |
|-----------|---------|---------------|
| 1,491,028 | Byers   | Apr. 22, 1924 |
| 1,542,810 | Anthony | June 23, 1925 |
| 1,582,440 | Uhrig   | Apr. 27, 1926 |
| 1,594,366 | Hering  | Aug. 3, 1926  |

#### FOREIGN PATENTS

| Number | Country       | Date |
|--------|---------------|------|
| 5,717  | Great Britain | 1888 |