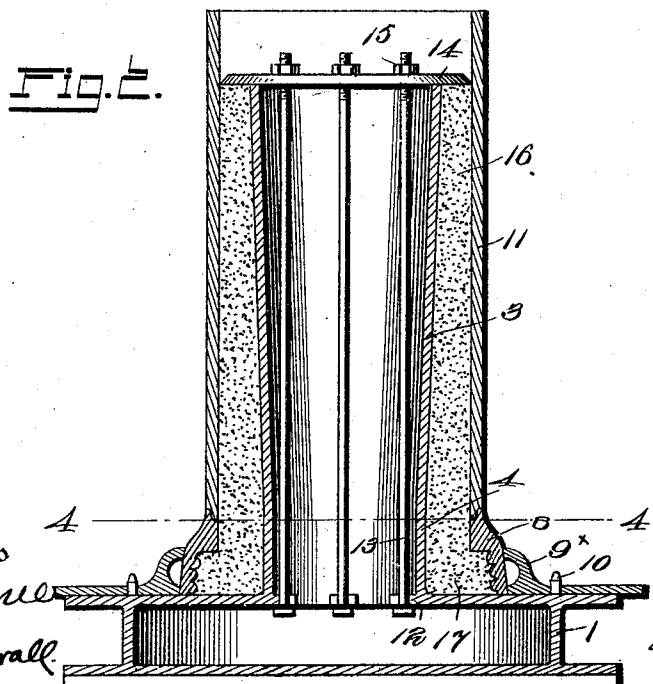
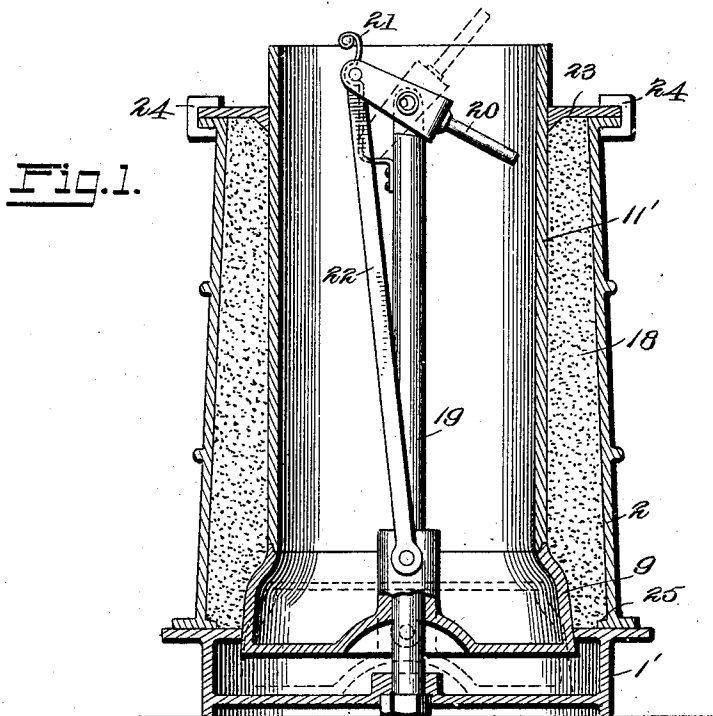


D. B. DIMICK.
METHOD OF CASTING PIPE.
APPLICATION FILED DEC. 14, 1907.

937,582.

Patented Oct. 19, 1909.

3 SHEETS—SHEET 1.



Witnesses
Geo. H. Dyer
H. Map. Dyer

Inventor
D. B. Dimick
by *Wichman*
Fisher and
Wichman
Attorneys

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3 SHEETS—SHEET 2.

Fig. 3.

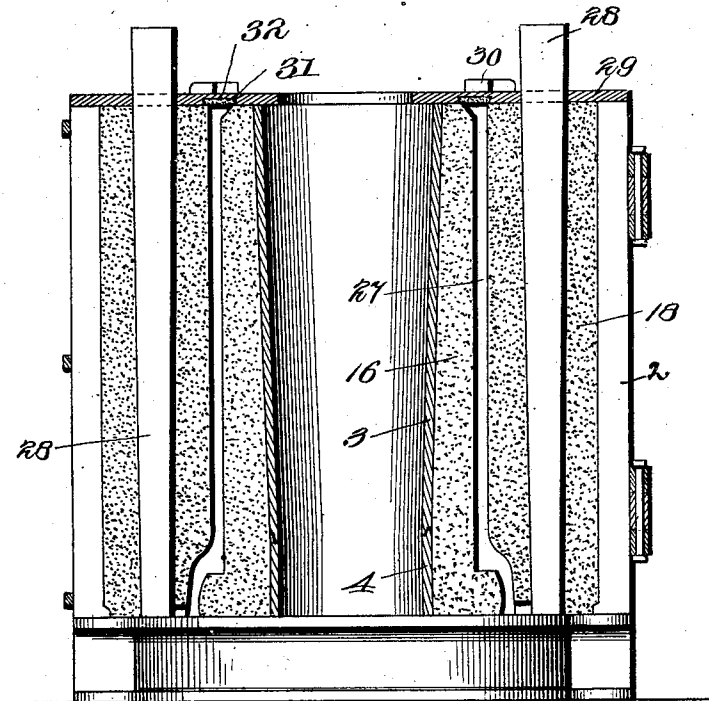
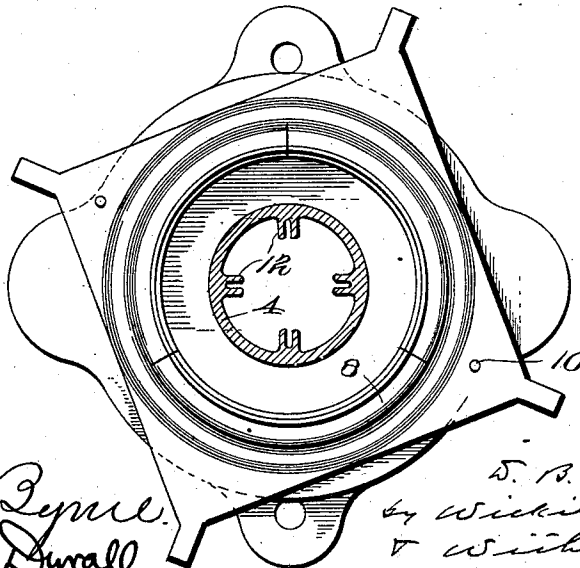


Fig. 4.



Witnesses
Geo. A. Lyne
W. (Map) Small

Inventor
D. B. Dimick
by *Wilkinson Fisher*
Wilkinson
Attorneys

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3 SHEETS—SHEET 3.

Fig. 5.

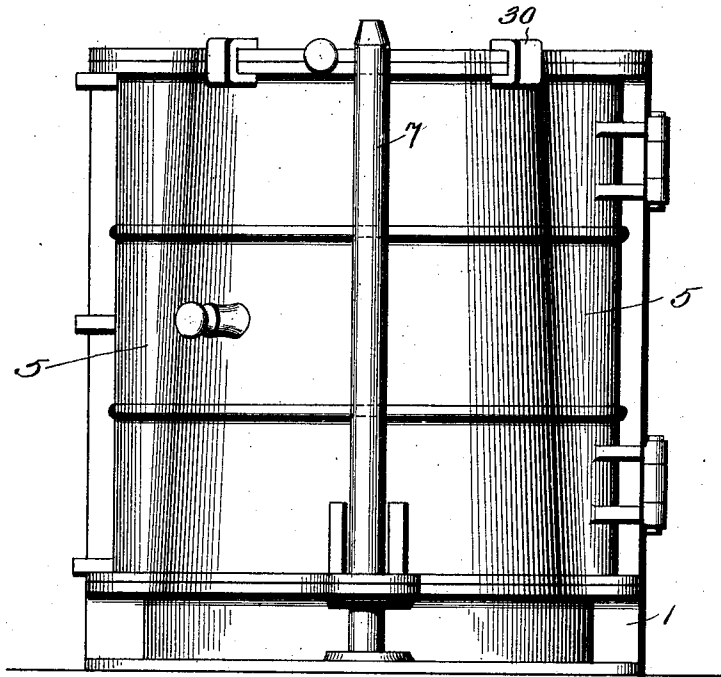
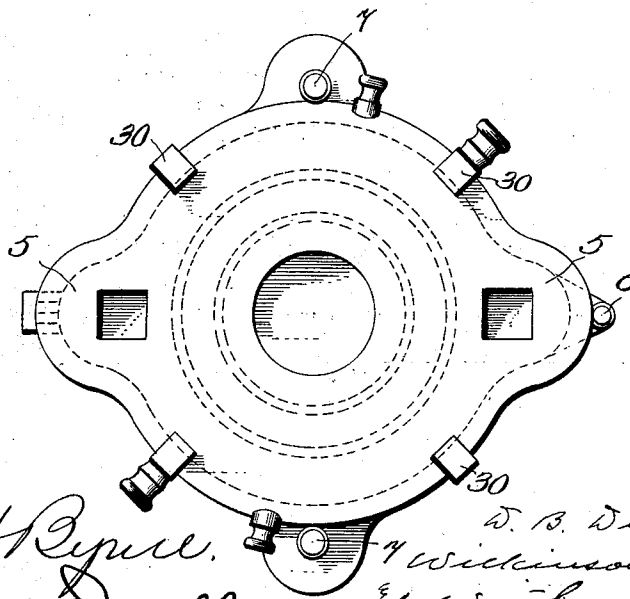


Fig. 6.



Witnesses
Geo. A. Ryer.
Mr. Max. Dural

Inventor
D. B. Dimick by
W. Wilkinson Fisher
Ed. Witherspoon
Attorneys

UNITED STATES PATENT OFFICE.

DANIEL B. DIMICK, OF BIRMINGHAM, ALABAMA, ASSIGNOR TO AMERICAN CASTING COMPANY, OF BIRMINGHAM, ALABAMA, A CORPORATION OF ALABAMA.

METHOD OF CASTING PIPE.

937,582.

Specification of Letters Patent.

Patented Oct. 19, 1909.

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To all whom it may concern:

Be it known that I, DANIEL B. DIMICK, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Methods of Casting Pipes, and do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in methods for casting pipe, and it is distinguished from the methods now in vogue for this purpose, in that the pipe is cast on end, with the bell portion down instead of having the bell portion up, and it also may be used in connection with a green sand mold, instead of the dry sand mold now commonly employed.

It is well known that after a pipe section is cast by the ordinary method, and the metal allowed to set, that it is exceedingly difficult and some times almost impossible, to free the cast section from the sand mold core, in fact the latter some times sticks so tight to the pipe section that it has to be broken out of the same. It is also well known that the process of casting pipe sections by the present methods are slow and tedious, especially when dry sand is employed, and therefore, these methods are more expensive than they should be.

It is the object of my invention to overcome these difficulties, and to provide a method by which perfect pipe sections may be readily and quickly cast; readily and quickly removed from the mold after they are cast; and one in which the mold members themselves are more quickly made than has heretofore been considered possible.

To these ends my invention consists in the novel steps constituting my method more fully hereinafter disclosed, and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification and wherein like numerals refer to like parts in all the views:—Figure 1, represents a longitudinal sectional view of an apparatus for making the outer mold member of my mold. Fig. 2, is a like view of an apparatus for making the core member of my mold. Fig. 3, a longitudinal sectional view showing the outer and inner mold members of my mold

assembled, and the drag portion of my apparatus in elevation. Fig. 4, is a plan view taken on the line 4—4 of Fig. 2, showing the sectional bell pattern and centering ring. Fig. 5, is an elevational view of the drag and cope members assembled, and Fig. 6, a plan view of the same.

Referring to the drawings, 1, represents the drag, 2, the cope, and 3, a tapered sectional core barrel. This core barrel 3, fits down upon a cylindrical turret portion 4, integral or otherwise attached to the drag 1, as best shown in Figs. 2 and 3.

The cope portion of my apparatus is provided at diametrically opposite sides with swells 5, best shown in Figs. 5 and 6, in order to accommodate the sprue gates and rods. This cope portion of my apparatus is likewise formed in two parts hinged together at 6, as shown, and is provided with suitable securing clamps and also guide rods 7, all as fully described in my Patent No. 880,284, on apparatus for casting pipe.

In forming my mold members, I may form both members in one operation, by packing the sand around a suitable pattern, comprising a sectional bell portion, then withdrawing the said portion longitudinally and withdrawing the bell portion laterally, all as described in my former patent above, but I prefer to proceed as follows:—I prefer to form the inner mold member in one apparatus, shown in Fig. 2, and the outer mold member in a distinct and separate apparatus, shown in Fig. 1. These two operations are carried on simultaneously, but by two different sets of men. In carrying out this method of making my mold, I employ a double set of patterns comprising two barrel members 11 and 11', and two bell patterns, the one a sectional bell pattern numbered 8, and the other a solid bell pattern numbered 9. The sectional bell pattern 8, shown in Figs. 2 and 4, is provided with a centering ring 9^x, secured to the drag 1, by means of pins 10, passing through holes in the centering ring 9^x, all as disclosed in my patent above. This pattern seats in the ring 9, which is secured in a definite position upon the drag 1, and therefore, I am certain of always securing my sectional bell pattern in exactly the same position at each operation. When the pattern is thus secured to the drag 1, sand is rammed in between the same and the turret portion 4, up to, ap-

proximately, the top of said pattern 8. When this is accomplished, the barrel portion 11, of the pipe pattern is placed in position, as shown in Fig. 2, and the sand then
 5 rammed up to the top of the core barrel 3. The drag portion 1, is provided with suitable lugs 12, as shown, to which are fastened rods 13, passing up inside the core barrel and through the interior stripping plate 14,
 10 which is placed on top of the core barrel 3, as soon as the sand reaches the top of the same, and the said bolts 13, are then secured to the stripping plate, by any suitable means as by the nuts 15, shown. When this
 15 is done, the barrel pattern 11, may be slipped longitudinally off the sand core 16, thus formed; the centering ring 9*, may be lifted off the securing pins 10, and the sectional bell pattern 8, laterally drawn away from
 20 the bell portion 17, of the sand core 16.

The apparatus for forming the outer mold member 18, of the mold is shown in Fig. 1, wherein a solid bell pattern 9, instead of a sectional bell pattern is used, and a barrel
 25 pattern 11', the exact duplicate of the barrel pattern 11, is also employed. This solid bell pattern 9, is slidably mounted upon a vertical rod 19, secured to the bottom of the shipping stool 1', as shown, and provided
 30 at its upper end with the lever 20, and the securing spring 21; a rod 22, connects the lever 20, with the bell pattern 9, as shown; the arrangement being such that when the lever 20, is manipulated the bell pattern 9,
 35 is raised and lowered as indicated in dotted lines in Fig. 1. Cope 2, surrounds the barrel pattern 11', and the bell pattern 9, as shown and when the said bell pattern is in uppermost position, with the barrel pattern
 40 11', superimposed upon it, sand is filled in between the same and the said cope until it reaches near the top of said cope 2. The outer stripping ring 23, is then placed, and bedded into position, the sand being securely
 45 tucked underneath said stripping ring 23. Said outer stripping ring is then clamped into position by means of the clamps 24. When the stripping ring 23, is thus firmly secured the barrel pattern 11', is longitudinally
 50 drawn out, and the bell pattern 9, lowered by raising the lever 20, to the dotted line position shown. The cope 2, is provided with the interior circumferential flange 25, which serves to hold the sand when the said
 55 cope is lifted off the stripping stool 1'. The outer mold member 18, being thus finished, and the inner mold member 16, having been finished in the manner described, the cope 2, containing the outer mold member is lifted
 60 off the stripping stool 1', by any suitable means and the same is lowered down over the inner mold member 16, until the said cope 2, rests upon the drag 1, as best shown in Fig. 3.

65 In order that the outer mold member 18,

shall occupy the exact position around the inner mold member 16, that is necessary, in order to form the desired mold cavity 27, the guide pins 7, are provided. These pins, as fully disclosed in my patent above, are
 70 connected with the drag 1, serve to guide and to center the cope member when it is being lowered down upon the drag 1, and the configuration of the cope and drag are such, that when they are perfectly matched
 75 it is absolutely certain that the mold cavity will be of the exact form and dimensions as the pattern from which it was made.

In forming the outer mold member 18, as above described, of course, sprue rods 28,
 80 were placed in position, and consequently passages for molten metal to the mold cavity were formed. After the mold members 16 and 18, have been brought to place, as shown in Fig. 3, the stripping plate 14, is removed
 85 from the inner mold member 16, and the stripping ring 23, is removed from the outer mold member 18, and a cope plate 29, provided with annular under cut grooves 31, filled with sand 32, is placed over the two
 90 mold members, and firmly secured to the cope by means of the clamps 30, as shown in Figs. 3, 5 and 6. After this cope plate 29, is secured into position the sprue rods 28,
 95 may be conveniently drawn and sprue gates formed, through which a metal may be poured into the mold. Or the sprue rods may be withdrawn before the barrel pattern 11' or the stripping ring 23, is removed.

The above operations may be carried out
 100 either with dry sand or with green sand. But it is more expeditious and quicker to use green sand. It is also evident, as above stated, that the two mold sections may be made in one operation and with one appa-
 105 ratus, as disclosed in my patent above, and of course either green sand or dry sand could be used in that case also. In order to use green sand it is very desirable, that the inner core barrel 3 shall be tapered, as shown,
 110 with the small end of the same downward. This facilitates the withdrawing of the said core barrel soon after the metal in the pipe sets, and before it has expanded sufficiently
 115 to cause it to crack. By thus withdrawing the said core barrel 3, it is also very much easier to remove the sand of the inner mold from the pipe, than it is in the older methods. Especially is this true, when green
 120 sand is used, which of course is not so hard after the casting operation, as is dry sand.

The two mold members being assembled as shown in Fig. 3, and the sprue rods 28 being withdrawn from the outer mold member 18, the runner is suitably formed on top
 125 of the cope plate 29, and the metal is poured in. After the cast is made, the clamps 30 are taken off, the cope plate 29 removed, and the inner core barrel 3 removed, and the cheek sections opened out as soon as the
 130

metal sets. This, as above set forth, allows the pipe to contract in cooling, and therefore cracks are avoided. In fact, I have learned from experience, that if the core barrel is not pulled out at the right time, in casting short sections of very large pipe, the same are liable to crack from end to end. But each time the core barrel is pulled out immediately after the metal sets, the pipe sections are perfect castings. It greatly facilitates the successful molding of pipe to hinge the cheek sections as above described, and to also open the cope portion of the flask as soon as the core barrel is withdrawn. I preferably give my cope a taper as shown in order that the sand may be the more easily removed therefrom after casting.

It will thus be seen that by my process, the use of green sand allows the core barrel of the mold to be removed quite easily, if it is done immediately after casting, and as soon as the metal has set in the mold. The use of green sand also avoids the delay that is attendant upon the use of dry sand, since it saves the time consumed in drying the molds; and it therefore does not restrict the output to such an extent as does the use of dry sand. In fact, briefly stated, my process comprises the following combined features which are new to the art of molding and casting pipe bell end down:—(a) the use of green sand throughout; (b) the employment of the stripping plate method for the removal of the bell pattern; (c) the employment of a sectional bell pattern combined with a lateral draw; (d) the employment of a divided pattern at the bell joint, the barrel portion of this pattern stripping upward, and the bell portion stripping downward; (e) the employment of a removable core barrel for removal after casting; (f) the employment of a double set of patterns for the simultaneous production of the several parts of the mold, whereby one set of men may ram the stripping stool 1' in connection with a longitudinally movable bell pattern 9, thus constituting an inside or core part of the mold, while another set is ramming the outside; and (g) the employment of a cope plate securely sealed down, whereby a practically sealed mold is obtained, and an equalization of the pressures in the gate cavity and in the mold cavity is secured. If the air or gas is allowed to escape through the joint between the cope plate and the cheek or central part of the mold, the mold being made of green sand is liable to cave in between the gates and the mold cavity. These gases are permitted to escape laterally through the vertical joints between the half sections of the pivoted cheek members, or through suitable holes in the same, and in a manner well known.

Of course I do not wish to be limited to the exact mode of procedure above described,

since as above stated, the process may be carried out with green sand, or for that matter with dry sand, in the manner disclosed in my former patent above, or it may be considerably modified in other particulars without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent is:—

1. The method of casting pipe which consists in simultaneously forming the inner and outer mold members from a double set of patterns comprising a barrel portion and a sectional bell portion, withdrawing said barrel portion of the double set of patterns and laterally removing the bell portion of the patterns, then lowering the outer mold member over the inner mold member and introducing molten metal within the formed mold, substantially as described.

2. The method of forming a core member of a mold for casting pipe, which consists in suitably forming said member out of green sand between a removable tapered sectional inner core barrel, and an outer removable barrel member, having associated therewith a laterally removable sectional bell pattern; in then vertically withdrawing and stripping said outer barrel member; and in laterally withdrawing said sectional bell pattern, substantially as described.

3. The method of forming the inner mold member of a mold for casting pipe bell downward, which consists in suitably forming said mold member within a vertical barrel member with a sectional bell pattern at its lower end; in vertically withdrawing said barrel member, and in laterally withdrawing said bell pattern after the said mold member is completed, substantially as described.

4. The method of forming the inner mold member of a mold for casting pipe bell downward, which consists in suitably forming said member between an inner barrel member, an outer barrel member and a sectional laterally removable bell pattern, associated with said outer barrel member and suitably centered; suitably ramming up the mold member; vertically withdrawing the outer barrel member and laterally withdrawing said sectional pattern, substantially as described.

5. The method of forming from green sand the inner mold member of a mold for casting bell shaped pipe sections with the bell end downward, which consists in employing a suitable drag having a turret portion, an inner core barrel, a laterally removable bell pattern, a centering ring for the same, an outer barrel member, and a stripping plate associated therewith; suitably assembling said parts and ramming up said mold member, then securing said stripping plate to said core barrel, longitudinally

withdrawing said outer barrel member, then removing said centering ring and laterally withdrawing said sectional bell pattern, substantially as described.

5 6. The method of forming the inner and outer mold members of a mold for casting bell shaped pipe sections which consists in forming the inner mold member with the aid of an outer barrel member and a sectional bell pattern at its lower part; in
10 suitably forming the outer mold member in a single piece; in vertically withdrawing said barrel member; in laterally withdrawing said sectional pattern while said mold
15 members are separated, and then lowering said outer mold member over said inner member into the proper position to form the mold cavity, substantially as described.

7. The method of forming the inner and
20 outer mold members of a mold provided with a cope for casting bell shaped pipe sections which consists in forming the inner mold member with the aid of a sectional bell pattern at its lower part, and in simultane-
25 ously forming the outer mold member between a second pattern and the cope; laterally withdrawing said sectional pattern; withdrawing said second pattern and then lowering said outer mold member over said
30 inner member into position to form the mold cavity, substantially as described.

8. The method of casting pipe in green sand molds, which consists in suitably forming the inner and outer mold members, the
35 inner member being hollow and formed around an inner core barrel; introducing molten metal within the formed mold and vertically removing said core barrel immediately after the metal sets and while said
40 metal is cooling in the mold cavity, substantially as described.

9. The method of casting pipe which consists in forming the inner mold member around a vertically removable core barrel; forming the outer mold member around a
45 suitable pattern having a detachable barrel portion, and a bell portion; vertically withdrawing the barrel portion of the pattern; removing the bell portion of the pattern; lowering the outer mold member over the
50 inner mold member, introducing molten metal within the formed mold, and vertically withdrawing said core barrel immediately after the metal sets and while said metal is cooling in the mold cavity, substantially as described.
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10. The method of casting pipe which consists in forming the inner mold member around a detachable tapering core barrel and the outer mold member around a suitable
60 barrel pattern, and a bell pattern; vertically withdrawing each of said patterns; suitably positioning said outer member in relation to said inner member to form a mold cavity, pouring metal into said cavity and then
65

withdrawing said tapering core barrel immediately after the metal sets and while the metal is cooling, substantially as described.

11. The method of preparing a mold provided with a cope for casting pipe sections
70 bell end downward, which consists in forming the inner mold member between a core barrel and a pattern comprising a barrel portion and a sectional bell portion, and in forming the outer mold member between
75 the cope and another pattern also comprising a barrel portion and a bell portion, longitudinally removing each of said barrel portions, removing laterally said sectional bell portion, and finally lowering the outer
80 mold member over the inner mold member to form the mold cavity, substantially as described.

12. The method of casting in a mold having a cope pipe sections bell end downward, which consists in forming an inner mold
85 member between a core barrel, and a pattern having a barrel section and a bell section, in simultaneously forming the outer mold member between the cope and another pattern
90 having a barrel section and a bell section, removing each of said patterns from said mold members suitably assembling said members to form the mold cavity, pouring in the metal and removing said core barrel im-
95 mediately after the metal sets and while the metal is cooling, substantially as described.

13. The method of casting in a mold having a cope pipe sections bell end downward, which consists in forming an inner mold
100 member between a core barrel, and a pattern having a detachable barrel section and a sectional bell portion, in forming the outer mold member between the cope and another pattern having another detachable barrel section
105 and another bell portion longitudinally withdrawing each of said barrel sections from each of said mold members, removing each of said bell sections from said members, suitably assembling said members to form
110 the mold cavity, pouring the metal and removing said core barrel immediately after the metal sets and while the metal is cooling, substantially as described.

14. The method of casting in a mold having
115 a cope pipe section bell end downward, which consists in forming an inner mold member between a core barrel, and a pattern having a detachable barrel section and a sectional bell portion, in forming the outer mold member between the cope and another pattern
120 having another detachable barrel section and another bell portion, longitudinally withdrawing each of said barrel sections from each of said mold members, removing each
125 of said bell sections from said members, the sectional bell portion of one pattern being laterally withdrawn, suitably assembling said members to form the mold cavity, pouring the metal and removing said core barrel
130

immediately after the metal sets and while the metal is cooling, substantially as described.

15 15. The method of casting pipe sections bell end downward, which consists in forming the inner mold member out of green sand between a detachable core barrel and a pattern having a bell shaped section, suitably forming the outer mold member, suitably assembling the said members to form the mold cavity, pouring the metal and withdrawing said core barrel immediately after the metal sets and while the metal is cooling, substantially as described.

15 16. The method of casting pipe sections bell end downward which consists in forming the inner mold member out of green sand between a detachable core barrel and a pattern having a bell shaped section, suitably forming the outer mold member around another pattern having a bell shaped section, suitably assembling the said members to form the mold cavity, pouring the metal and withdrawing said core barrel immediately after the metal sets and while the metal is cooling, substantially as described.

30 17. The method of casting pipe sections which consists in forming the inner mold member out of green sand and between a detachable core barrel and a pattern having a detachable barrel portion and a sectional bell portion; suitably forming the outer mold member, longitudinally withdrawing said

barrel and laterally withdrawing said bell portion of said pattern, assembling the said members in order to form the mold cavity; pouring the metal and withdrawing the core barrel while the metal is cooling, substantially as described.

18. The method of casting pipe which consists in forming the inner mold member out of green sand around a detachable core barrel, in forming the outer mold member in a tapered cope, suitably assembling the said members, pouring the metal and withdrawing the core barrel immediately after the metal sets and while the metal is cooling, substantially as described.

19. The method of casting pipe which consists in forming the inner mold member out of green sand around a detachable core barrel, in forming the outer mold member in a cope provided with hinged sections, suitably assembling the mold members to form the mold cavity, pouring the metal, and withdrawing the core barrel and opening the cope sections immediately after the metal sets and while the metal is cooling, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

DANIEL B. DIMICK.

Witnesses:

HENRY HIGDEN,
E. H. WRENN, Jr.