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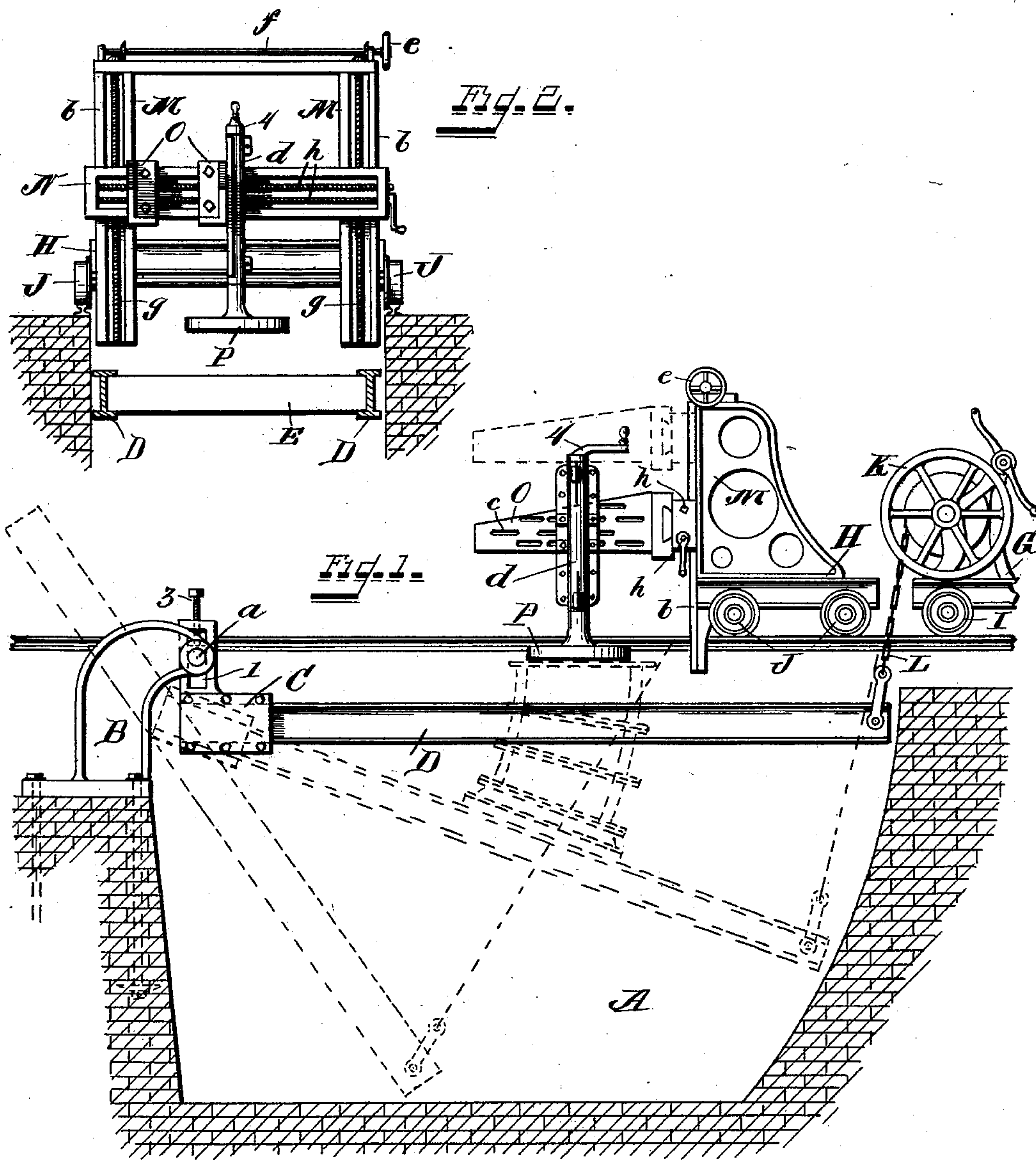
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APPARATUS FOR MAKING MOLDS AND CORES.

(Application filed Jan. 25, 1902.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses.

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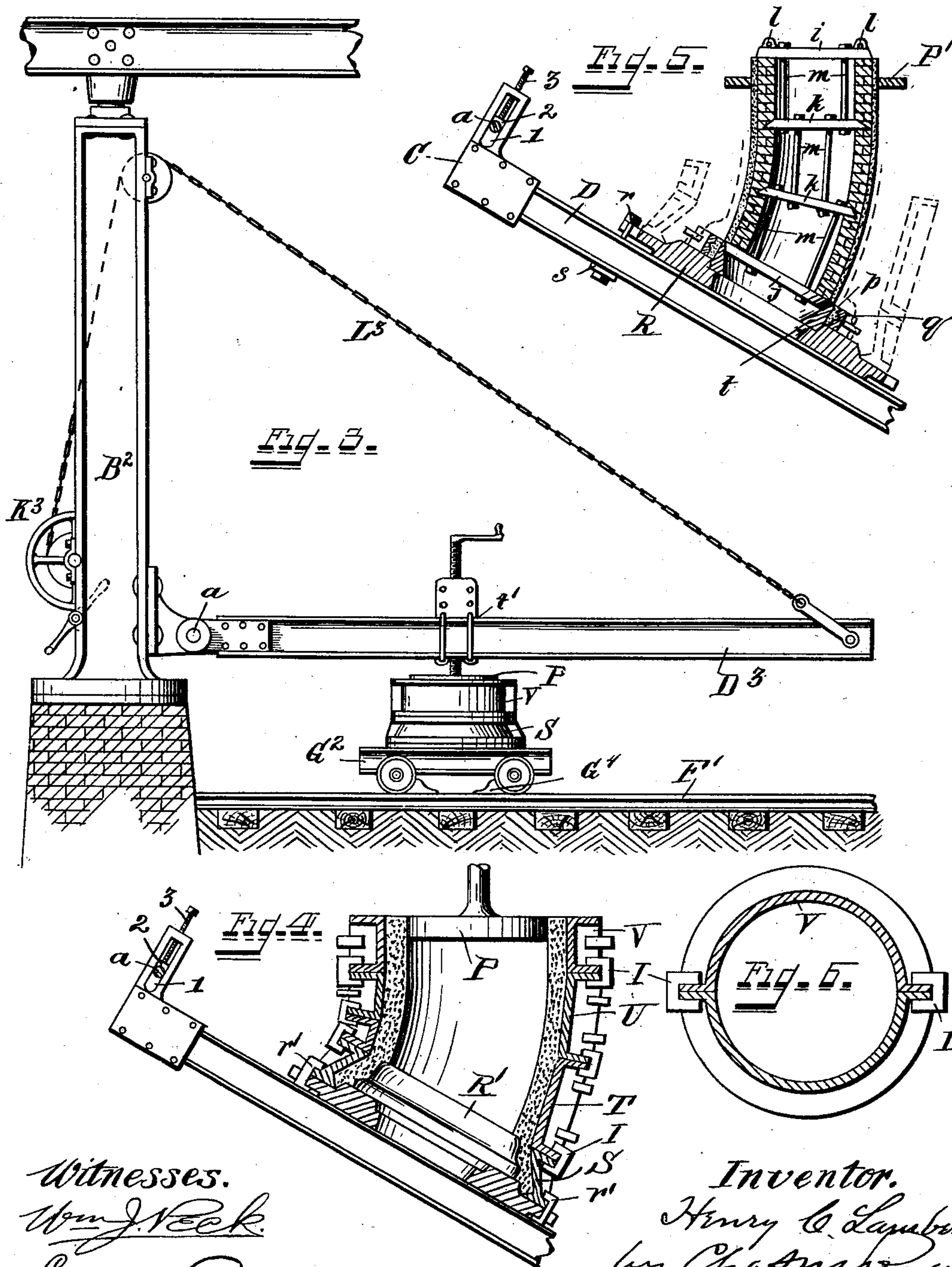
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(Application filed Jan. 25, 1902.)

(No Model.)

3 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING MOLDS AND CORES.

SPECIFICATION forming part of Letters Patent No. 697,635, dated April 15, 1902.

Original application filed August 2, 1901, Serial No. 70,572. Divided and this application filed January 25, 1902. Serial No. 91,205. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. LAMBERT, a citizen of the United States, residing at Fernbank, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Apparatus for Making Molds and Cores for Cast-Metal Pipes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an improved simple apparatus for making molds and cores for cast-metal pipes whereby the same can be made in an upright position and can be of any length and curvature desired and can be made straight at either or both ends, as desired.

The novelty of my invention will be hereinafter more fully set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1, Sheet 1, is a sectional side elevation of an apparatus embodying and for carrying out my invention. Fig. 2, Sheet 1, is a front elevation of the former-carriage looking to the right of Fig. 1 and showing the pit in section. Fig. 3, Sheet 2, is a side elevation of a modified form of apparatus for carrying out my invention. Fig. 4, Sheet 2, is a sectional elevation of a partly-formed mold and associated parts. Fig. 5, Sheet 2, is a corresponding view of a finished core. Fig. 6, Sheet 2, is a sectional plan view of one section of a flask. Fig. 7, Sheet 3, is a sectional side elevation of a still further modified form of apparatus for carrying out my invention. Fig. 8, Sheet 3, is a detailed plan view of the outer end of one of the swinging beams, showing a core-former attached thereto. Fig. 9, Sheet 3, is a sectional detail on the dotted line xx of Fig. 7 with the windlass mechanism removed.

The same characters of reference are used to indicate identical parts in all the figures.

My invention is designed more particularly for the making of molds and cores for casting bends for very large pipes up to fifty or sixty inches in diameter or beyond in the water-main, gas, and sewer service in large cities

and for other uses. Heretofore the casting of bends for these very large pipes has been a matter involving a large outlay of money and time in the construction of patterns and of molds to make the necessary bend-castings, and as an illustration I would say that to make molds for an ordinary fifty-inch bend it required about ten days' pattern-work and the work of a molder and his assistant for fifteen days to make a single mold, whereas by my improved apparatus the mold and core to make the same bend can be made by the molder and his assistant in three days or less. Also in the construction of these large molds and cores for bends the practice has been heretofore to build them up with the mold and core lying flat or in a horizontal position, necessitating the use of brickwork and heavy framing or heavy iron flasks for the outside mold and the placing of the core within this mold without adequate support for centering it, so that when the metal was poured into the mold the core would frequently be raised or floated, not only causing an inequality in the thickness of the castings, but also permitting the dross to collect upon the upper side of the core, where the metal is thinnest, and the casting resulting therefrom consequently thinnest, thus producing in the resultant casting the poorest quality of metal, with possible sand-holes in the part of the casting which is thinnest. My invention by the production of the mold and core in an upright position and in its manner of construction, as hereinafter explained, obviates all of the objectionable features and enables me to produce a bend-casting which shall be of uniform thickness throughout and with uniform density of metal, thereby not only enabling a mold and core to be constructed in a much simpler, cheaper, and quicker manner than before, but also as a result thereof producing a casting of a uniform and superior quality which shall be as near perfect as possible to make castings of this character.

Referring now to Figs. 1, 2, 4, and 5 as illustrative of the preferred form of apparatus embodying and for carrying out my invention, I would say that A is a pit, preferably with

brick or stone walls and having a width sufficient to accommodate the largest diameter of mold intended to be formed. At one end of this pit are secured head-blocks B, between
 5 which are pivoted, as at *a*, hanger-blocks C, to which are adjustably secured the rear ends of a pair of parallel I-beams D. (see Figs. 2 and 8,) connected together at their forward ends and at intermediate points, if desired,
 10 by spacing-blocks E. The pivots *a* project at their ends through slots 1 in the hanger-blocks C and have follower-blocks 2 resting upon them and guided in said slots and made adjustable by set-screws 3 passing through the
 15 upper end of the slotted portions of the hanger-blocks and by means of which the pivotal points *a* of the beams D may be vertically adjustable, as will be readily understood. Upon each side of the pit is a rail forming a track
 20 for two carriages G H, mounted thereon by wheels I J. The carriage or truck G has upon it a windlass mechanism K, connected by a chain or chains L to the end of the swinging frame D which is farthest from its pivot *a*,
 25 so that by operating the windlass the swinging frame or carrier D can be lowered into the pit or raised therefrom, as desired. The carriage or truck H, Figs. 1 and 2, has upon it two vertical and parallel uprights M, with vertical ways *b* upon their forward faces and upon
 30 which are gibbed a vertical movable cross-head N, having upon its front face a transverse way, upon which are gibbed two horizontal arms O, provided with horizontal slots
 35 *c* and operated by screws *h* to draw them together or spread them apart, as desired. By means of a hand-wheel *e*, transverse shaft *f*, and connecting-gearing two vertical screws *g*, in proper bearings and engaging the cross-
 40 head N, may be simultaneously operated to raise and lower the cross-head N. The connection of these parts forms no part of my invention, and they therefore need no further description. Adjustably bolted to either of
 45 the arms O is a vertical sleeve *d*, in which is journaled a crank-operated spindle 4, carrying on its lower end a shaper in the form of a flat circular disk P, which has a diameter just equal to that of the pipe-bend to be con-
 50 structed.

I will now explain how an apparatus constructed as above described can be used to construct molds for pipe-bends in accordance with my invention, referring particularly to
 55 Figs. 4, 5, and 6.

Suitably clamped upon the I-beams D, which form the carriers in this instance, by means of bolts *r* and cross-bars *s*, is a bottom ring R, which forms the base of the mold and
 60 which I term the "chill-plate." On this is centered a pattern R' to form the bell or socket of the pipe-casting. Also secured to the ring R by means of clamps *r'* is a two-part circular section S of the flask for the exterior
 65 mold. When this has been secured in place, sand or loam is rammed into the flask around the bell or socket pattern R', and then the

shaper is brought down upon the top of the pattern R', and a second section T of flask is
 70 clamped by clamps I to the first section S, and sand or loam is rammed around the pattern P, and upon the sand or loam already within the flask, and the carrier D is slightly low-
 75 ered to bring the pattern P with its lower side nearly up to the top of the rammed sand or loam, and more sand or loam is then added
 80 around said pattern and rammed within the flask-section T, and so on until the flask-section T is completely rammed with sand or loam, the carrier B being gradually lowered
 85 as this ramming takes place. Then the shaper P comes to the upper edge of the flask-section T, another flask-section U is clamped upon the section T, and the operation of ram-
 90 ming sand or loam around the shaper continues, while the carrier D is gradually lowered. Should the pattern P while the sand or loam is being rammed around the same
 95 within the flask-sections refuse to clear itself from the sand or loam within the flask when said flask is lowered, it only becomes neces-
 100 sary to revolve the pattern P by means of the crank-spindle 4, whereupon the interior of the mold will be made perfectly smooth. It will be observed that the flask-sections are
 105 made to approximate the desired curvature to be given the mold and that by the lowering of the carrier D the shaper P travels within the flask-sections in the arc of a circle
 110 struck from the pivots *a* of the carrier, and by shifting the position of the shaper and flasks upon the carrier different degrees of curvature may be given to the mold and re-
 115 sultant castings. It will also be observed that the flask-sections, while tubular in cross-section, are some of them made with their top and lower sides, either or both, beveled,
 120 so that the flask can be built up to approximate the curvature desired to be given to the mold and pipe-bend which is afterward cast therein. Where it is desired to finish the up-
 125 per or lower end of the outer mold or core straight—that is to say, without any bend—the upper or lower flask-sections, as V, are made perfectly straight and are clamped to the
 130 sections below them, and the shaper P is then raised by screws *g* *g* in a vertical line and to a distance equal to the length of the straight end of the pipe to be cast, the carrier D mean-
 135 while remaining stationary, it being understood that the operation of packing sand and adding flask-sections goes on as before described. When the exterior mold has been thus completed, it is removed from the carrier D and set to one side. The bell or socket pat-
 140 tern R' is taken out, the chill-plate ring R being left secured upon the carrier D in the position it formerly occupied and the carrier being drawn up to its horizontal position at the top of the pit. I next proceed to build the
 145 core upon this same chill-ring by first placing thereon and centering in the upper cavity thereof a metal ring or socket-iron *t*, Fig. 5, within an interior bevel and then clamp

around the same a two-part ring q , having a circumferential bead on its inner surface. Sand or loam is then rammed in between the rings t and q , as seen at p , to form a core for the bell or socket. A disk j , with a beveled edge corresponding in size and bevel to the interior bevel of the socket-iron, is then fitted within the top of said socket-iron t and circular brickwork is built up thereon, the carrier D being gradually lowered and a ring-shaper P' , which is substituted for the shaper P , is used as a guide in forming the curvature of the brickwork. At intervals in the brickwork are placed disks k , with their beveled edges entering the brickwork, and tie-rods m are employed to unite and bind the same together, and in this way the brickwork of the core is built up in the same manner and upon the same curvature that the exterior mold is made. Upon the top of the brickwork core thus made a plate i is secured, which is provided with hoisting-loops ll to enable the core to be lifted off bodily. When the brickwork of the core has been thus built up, sand or loam or a mixture of both is applied to its exterior, and the ring P' acts as a shaper to dress off its sides by the raising and lowering of the carrier D , as will be readily understood, said ring P' being likewise adjustable upon the carrier. When the core is thus completed, the divided ring q is removed from around the sand or loam p and the core itself is removed and the outside mold is again centered on the chill-plate ring and the core introduced within the outside mold by guiding it in from above and centering it upon the ring or socket-iron t . A runner-box is then applied to the top of the core and exterior mold and clamped thereto, and the mold is then ready to be poured. After the casting is made the clamps i are removed from the exterior mold and the mold itself taken away from the casting in sections and the core removed from within said casting.

In making molds for pipe-bends of different radii curvature it is only necessary to adjust the chill-plate R and associated parts upon the carrier D by measuring from its swinging center a to the required radius and there fastening them. In case it is desired to make a pipe-bend of short radius and long degree it is only necessary to shift the carrier D backward through its block C , as shown by the dotted line to the extreme left of Fig. 1, and then shifting the carriages H and G to their required positions above said carrier D to operate the same effectually, as before described.

In Fig. 3 I have shown a construction of apparatus for carrying out the foregoing method of construction in which the pit is dispensed with and the carrier D^3 is hung to a vertical post B^2 , as is common in gib-crane construction, and the same is operated by windlass mechanism K^3 and connecting-chain L^3 . In this case the mold and core are both built upon a truck or carriage G^2 , adjustably

secured by wedge-blocks G^4 to a track F' , and both the shapers P and P' are adjustably secured upon the carrier D^3 , as is shown at 70 71 . In all other respects the operation of constructing the exterior molds and cores is identical with that described before, except that instead of the core and mold being lowered into a pit the carrier is raised away from the same as the construction proceeds.

In Fig. 7 a still further modification of the apparatus is shown resembling both of the other constructions described in that it has the pit with carrier D' to be lowered therein and also the gib-crane construction of Fig. 3. The gib-crane construction in this modification when raised may be swung from side to side above the pit for the purpose of handling the tools and also the exterior mold and core when they are completed. This construction also enables me to make exterior molds and cores of any desired radius and with a greater length of degree than either of the two before-described constructions of apparatus, for the one carrier can be lowered and the opposing carrier may be raised, as will be readily understood.

This application is a division of the application filed by me August 2, 1901, Serial No. 70,572, and the machine herein illustrated and described is the same as the machine shown in said application, and any subject-matter claimed by said application is hereby disclaimed in this case.

Wherever I have used the words "sand" or "loam" I do not mean to be limited to the use of those articles specifically; but I mean to include any self-adherent plastic material possessing the qualities of sand or loam in molding purposes, and in the claims I shall designate this material, whatever it is, as the "plastic" material.

Having thus fully described my invention, I claim—

1. In apparatus for making molds and cores for pipe-bends, the combination of a swinging carrier, mechanism for raising and lowering said carrier through the arc of a circle, and an adjustable shaper adapted to be shifted toward or from the pivotal axis of said carrier, substantially as described.

2. In apparatus for making molds and cores for pipe-bends, the combination of a swinging carrier, mechanism for raising and lowering said carrier through the arc of a circle, exterior mold and core mechanism adjustable on said carrier, and an adjustable shaper adapted to be shifted toward or from the pivotal axis of said carrier, substantially as described.

3. In apparatus for making molds and cores for pipe-bends, the combination of a swinging carrier, mechanism for raising and lowering said carrier through the arc of a circle, and a vertically-adjustable shaper adapted to be shifted toward and from the pivotal axis of said carrier, substantially as described.

4. In apparatus for making molds and cores

for pipe-bends, the combination of a pit, a swinging carrier pivoted at one end of said pit, mechanism for raising and lowering said carrier, and an adjustable shaper adapted to
5 be shifted toward or from the pivotal axis of said carrier, substantially as described.

5. In apparatus for making molds and cores for pipe-bends, the combination of a pit, a swinging carrier composed of I-beams united
10 together and pivoted at one end of said pit, adjustable mechanism for raising and lowering said carrier, and an adjustable shaper adapted to be shifted toward or from the pivotal axis of said carrier, substantially as described.
15

6. In apparatus for making molds and cores for pipe-bends, the combination of a pit, a swinging carrier composed of I-beams united
20 together and pivoted at one end of said pit, adjustable mechanism for raising and lowering said carrier, a track on the sides of said pit, a car on said track with means for locking it at any point desired, an adjustable shaper-carrier on said car, and a shaper adjustable on said carrier, substantially as described.
25

7. In apparatus for making molds and cores for pipe-bends, the combination of a pivoted vertically - swinging carrier, mechanism for
30 raising and lowering said carrier, a supporting base-piece on said carrier, and a stationary shaper registering with and above said

base-piece, whereby a flask may be placed upon said base-piece surrounding said shaper, and, as the plastic material is rammed in
35 around said shaper said carrier may be lowered and successive sections of flasks may be added and secured one above the other, as desired.

8. In apparatus for making molds and cores
40 for pipe-bends, the combination of a pivoted vertically-swinging carrier adjustable on its pivotal bearings, mechanism for raising and lowering said carrier, an adjustable supporting base-piece on said carrier, and an adjustable shaper registering with and above said
45 base-piece, whereby external molds or cores may be built up on said carrier having bends of different radii and with or without straight ends, as desired, substantially as described.
50

9. The combination of the pit A, the adjustable swinging carrier D pivoted at one end of said pit, a car G capable of traveling across the top of said pit, windlass mechanism on said car and connected to the free end of said
55 swinging carrier, a second carrier H capable of traveling across said pit, a former-carriage on said car, and an adjustable shaper on said former-carriage, substantially as described.

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