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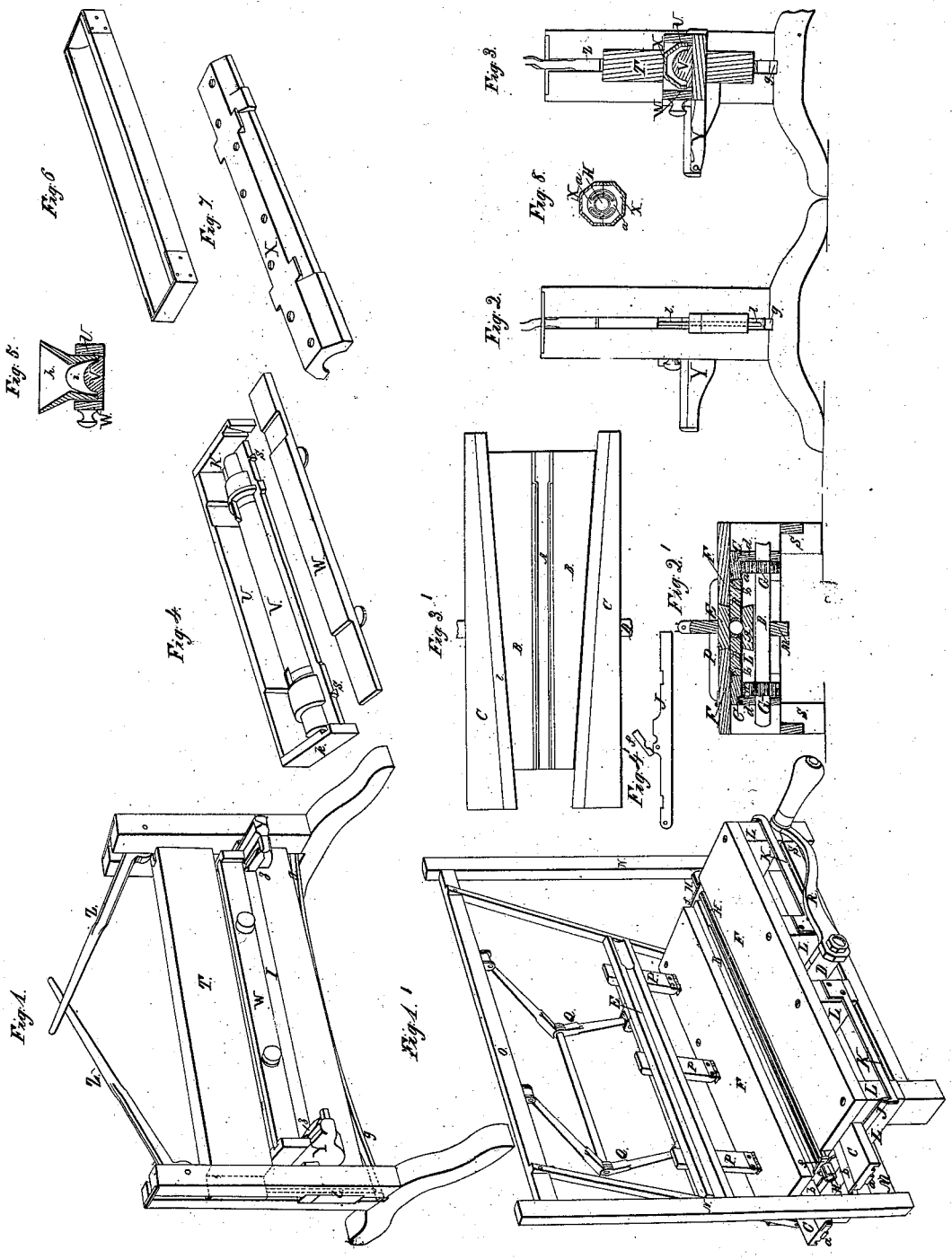
C. WARNER.

MOLDING AND COMPRESSING CORES.



UNITED STATES PATENT OFFICE.

CHAPMAN WARNER, OF LOUISVILLE, KENTUCKY.

IMPROVEMENT IN MOLDING AND COMPRESSING CORES.

Specification forming part of Letters Patent No. **6,013**, dated January 9, 1849.

To all whom it may concern:

Be it known that I, CHAPMAN WARNER, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and Improved Method of Constructing the Cores and Molds for Casting Metallic Pipes or Tubes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

The drawings on Sheet 1 represent my improved manner of forming pipe-cores; and those on sheet 2 represent my improved manner of forming the molds for casting pipes in.

I will first proceed to describe my improved method of forming pipe-cores.

S S are the posts, and L L are the transverse bearers of the frame-work which supports the parts made use of in the formation of cylindrical cores.

I form an adjustable core-box in the following manner: A is the metallic base of the core-box let into and secured to the bearers L L flush with their upper surfaces, as shown in Fig. 2. A longitudinal quarter-circle groove is formed in the upper side of the base A, which forms about one-fourth the core-box. Upon the top surfaces of the bearers L L, I place the sliding sections B B, forming the sides of the core-box, the inner edges of which rest upon the base A, and have quarter-circle grooves formed in them corresponding to and parallel with the groove in the base A. The sliding sections B are wedge-shaped. To the outer or oblique edges of the sections B B, I connect the forcing-wedges C C by means of the plates *b b* with descending lips or flanges projecting from the upper surface of the inner edges of the forcing-wedges, and fitting into grooves near the outer edges of the upper surfaces of the sections B B, as shown in Fig. 2. The outer edges of the forcing-wedges C C have grooves formed in their under sides which receive the ways *d d*, rising above the bearers L L, on which they freely traverse back and forth, and which prevent any lateral play of the wedges. The longitudinal movement of the forcing-wedges will bring the core-box sections B nearer to or remove them farther from each other, and will preserve their inner edges perfectly parallel with each other. When the inner edges of the sections B are brought to the edges of the groove in the base A, the respective grooves in each will form three-fourths of a circle. Motion is communicated to the forcing-wedges C C by means of racks *a a*, secured to their under surfaces, which match into the pinions G G on the driving-shaft D. The shaft D works in suitable bearings, and is driven by the crank R, or by any other appropriate means.

F F are pieces of plank or metallic plates, placed over the core-box sections B B and forcing-wedges C C, and confined in any convenient or suitable manner.

E is the top of the core-box, having a groove in its under surface corresponding with the grooves in the base and in the sides of the box. The edges of the box-cover E are inclined and fitted accurately into the space between the inner edges of the covering-plates F F, as represented in Fig. 2. The box-cover E is connected to the arms P P, which arms are hinged to one of the side covers, F, as shown in Fig. 1. It is also jointed to the toggle-joint levers Q Q, by which the cover is forced down into its place when the sand has been placed in the box for the formation of a core.

N N are the side posts rising from the longitudinal beam M, and O is the cap of the gallows-frame to which the upper portions of the toggle-joint levers Q Q are jointed.

I form the core upon a metallic tube, H. The improvement in this tube over the core-tubes heretofore used consists in the division of it by a longitudinal slit extending its entire length. The edges of the dividing-slit in the core-tube are separated from each other a sufficient distance to allow the core to diminish in size by the effect of the contraction of the metal forming a pipe in cooling, and thereby prevents the strain and injury to the pipe so frequently caused by unyielding cores. The tube H is retained in the center of the core-box by the bearing-plates J J, as represented in Fig. 1. The bearing-plates J J are confined at one extremity by joint-pins inserted into the outer sides of outer bearers, L L, and their other ends are supported by the spring-catches K K, made fast to the front ends of the central bearers, L L, and projecting to the right and left, as shown in Fig. 1. The core-tube is retained in the recesses formed for its reception in the bearing-plates J J by the cap-

pieces *f*, which are hinged to the plates and shut down over the tube. The cap-pieces *f f* also serve with the bearing-plates to close the ends of the core-box. In forming a core, I raise the cover E of the core-box and separate the sides B B thereof to a suitable and proper distance from each other, and place one-half the requisite quantity of sand required for the core, which I determine by measurement, between the two sides upon the base A. I then place the tube H in its bearings and cover it with the same quantity of sand first placed upon the base of the core-box. The cover E is next forced down into its place between the plates F F, and the operation is completed by forcing the sides B B up to their proper place for forming a perfectly cylindrical core by the coating of sand around the tube H. As soon as the core has been formed, as above set forth, the tube H is relieved of its bearings by detaching the spring-catches K K from the plates J J and allowing them (the spring-plates) to descend. The top E and the sides B B of the core-box are then withdrawn, and the core is lifted out and placed in its proper position for use, or for drying preparatory to being used.

The object of giving the core-tube H an elastic bearing is to enable the pressure to be equal and uniform on all sides of the same should there happen to be a larger quantity of sand on one side than on the other.

I will now proceed to describe my improved method of forming the molds which receive the cores before described preparatory to casting pipes therein, in which description reference will be had to the drawings on Sheet 2.

Fig. 1 is a perspective view of a press made use of for pressing the sand with the requisite compactness into the half-flask. I is the bed of the press. *y y* and *z z* are arms projecting forward from each end of the bed upon a line with its upper surface. The arms *y y* and *z z* serve as supports and guiding-ways for the reception of the bottomless forming-box composed of the sides U W and the ends *k k*, and the pattern V placed within the box. The ends *k k* are permanently secured to the back U of the forming-box, and the front W is inserted into vertical grooves in the ends *k k*, from which it can be readily removed.

I proceed to form a half-mold as follows: I draw the forming-box onto the arms *y y*, in front of the bed and platen of the press, and place the pattern V within the box. The ends of the base of the pattern rest upon the inner arms, *z z*. The lugs *s s*, projecting from the sides and ends of the base of the pattern, fit accurately against the sides and ends of the forming-box, preventing any horizontal movement of the pattern within the box and leaving an opening at the sides and ends of the base of the pattern for the escape of surplus sand. I place a hopper, *h*, within the forming-box, resting upon the outer edges of the base of the pattern, as shown in Fig. 5.

Fig. 6 represents a measure corresponding in length with that of the hopper *h*, and also with the length of the forming-box, in which I measure the sand required for placing in the hopper *h*. I fill the measure with sand and empty it into the hopper *h*, which covers the pattern V, as represented in Fig. 5. I then strike the sides of the hopper with sufficient force to settle the sand together and keep it in a compact form to allow the hopper to be drawn from the sand. After withdrawing the hopper I place the half-flask X over the sand and slide the forming-box in onto the bed of the press. The platen T is then forced down upon the half-flask X by means of the cam-levers Z Z, bringing the half-flask, sand, and pattern into the position represented in Fig. 3. In forcing down the half-flask X upon the sand covering the pattern V, should there prove to be a surplus of sand in the forming-box, it will be forced out through the openings at the sides and ends of the base of the pattern. After forcing the lining molding-sand into the half-flask X, as above described, the levers Z Z are thrown into a vertical position, thereby relieving the platen T from the pressure of the cams at the fulcrum ends of the levers and allowing the springs *g g*, attached to the under side of the bed, to raise the platen by means of the rods *l l* passing up through the tenons at the ends of the bed and bearing against the tenons at the extremities of the platen, as shown in Figs. 1 and 2. The forming-box is drawn forward onto the arms *y y* immediately after elevating the platen, the front W of the box is lifted out of the grooves that retain it, and the pattern with the half-flask X is carefully withdrawn from the box and taken to its appropriate place. The pattern V is then removed from the half-flask and again placed in the forming-box, to be used again in the manner above described.

The half-flasks formed by my improved method have gates formed in them, and pairs of them are confined together for casting pipes, in the usual manner; or the half-molds may be used for casting gutters or other concavo-convex articles.

I support the core and preserve it in the center of the mold by means of stays *a*, formed of narrow strips of thin sheet metal bent into the form represented in Fig. 8. The central portion of each of the strips of metal composing the stays *a* are bent into a semicircular curve corresponding to the inner surface of the molds, and the ends of the strips are bent inward and curved to correspond with the periphery of the core. A series of stays are placed in the lower portion of a mold at suitable distances from each other previous to locating the core within the same, and a corresponding number of stays are placed upon the core after it is located, directly above those laid in the mold, previous to placing the upper portion of the mold over the core. The series of stays thus combined with the core and mold, it will be perceived, will preserve

the core in the center of the mold, however great their length may be.

In forming the stays *a* it makes no essential difference whether the extremities of the thin metallic strips of which they are composed be turned so as to form the interior or exterior portion of the stays; or the thin metallic strips of which the stays are formed may be so bent as to bring their extremities to any other part of the stay; or their ends may be joined to each other, my object being to form a concavo-convex skeleton stay the sides of which to bear against the sides of the core and mold, leaving ample space for the metal forming a pipe to flow through between the sides of the stay.

By increasing the size of the stays so that they will fit into enlargements formed in the sides of the mold they will cause enlargements of the pipe at the points where they are located, which will add to the strength of the pipe.

My object in making use of more than two sections in the machinery for forming pipe-cores is to enable me to readily remove the cores from the sections without injury to the cores; and it will be apparent to all who are experienced in these matters that there may be considerable variation in the manner of constructing and operating the machine without deviating essentially from that herein represented and described. I do not, therefore, wish to be understood as intending to limit myself by the hereinafter-specified claims to the exact mechanical construction of the machinery for forming pipe-cores as herein described and represented, but shall vary it as I may deem expedient, while I attain the same end by means substantially the same.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The improvement in the core-tube H, caused by severing it by a longitudinal slit, for the purpose herein set forth.

2. The manner of compressing a coating of sand upon my improved core-tube, or upon any core tube or rod, (or the formation of solid sand cores,) by means of sections operated by machinery substantially in the manner herein described, one of said sections being stationary, toward which another section is forced in a direction perpendicular to its plane, and the two other sections being forced toward each other between the two first described, the whole of them arranged and operating substantially as herein described.

3. In combination with the above-mentioned core-box sections or any other analogous core-forming sections, the slightly-elastic core-tube bearing-plates J J and caps *f f*, (or their equivalents,) substantially in the manner and for the purpose herein set forth.

4. The manner of compressing the sand into a half-flask and giving it the impression of the pattern by placing the pattern at the base of a forming-box and covering it with sand, and then placing the half-flask upon the sand covering the pattern, and forcing it down upon the same by machinery, substantially as herein described.

5. The manner of preserving the cores in a central position within the molds by means of concavo-convex skeleton or open stays *a*, formed of thin narrow sheets of metal, and combined with a core and mold, substantially in the manner herein represented and described.

CHAPMAN WARNER.

Witnesses:
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THOS. EAMES.