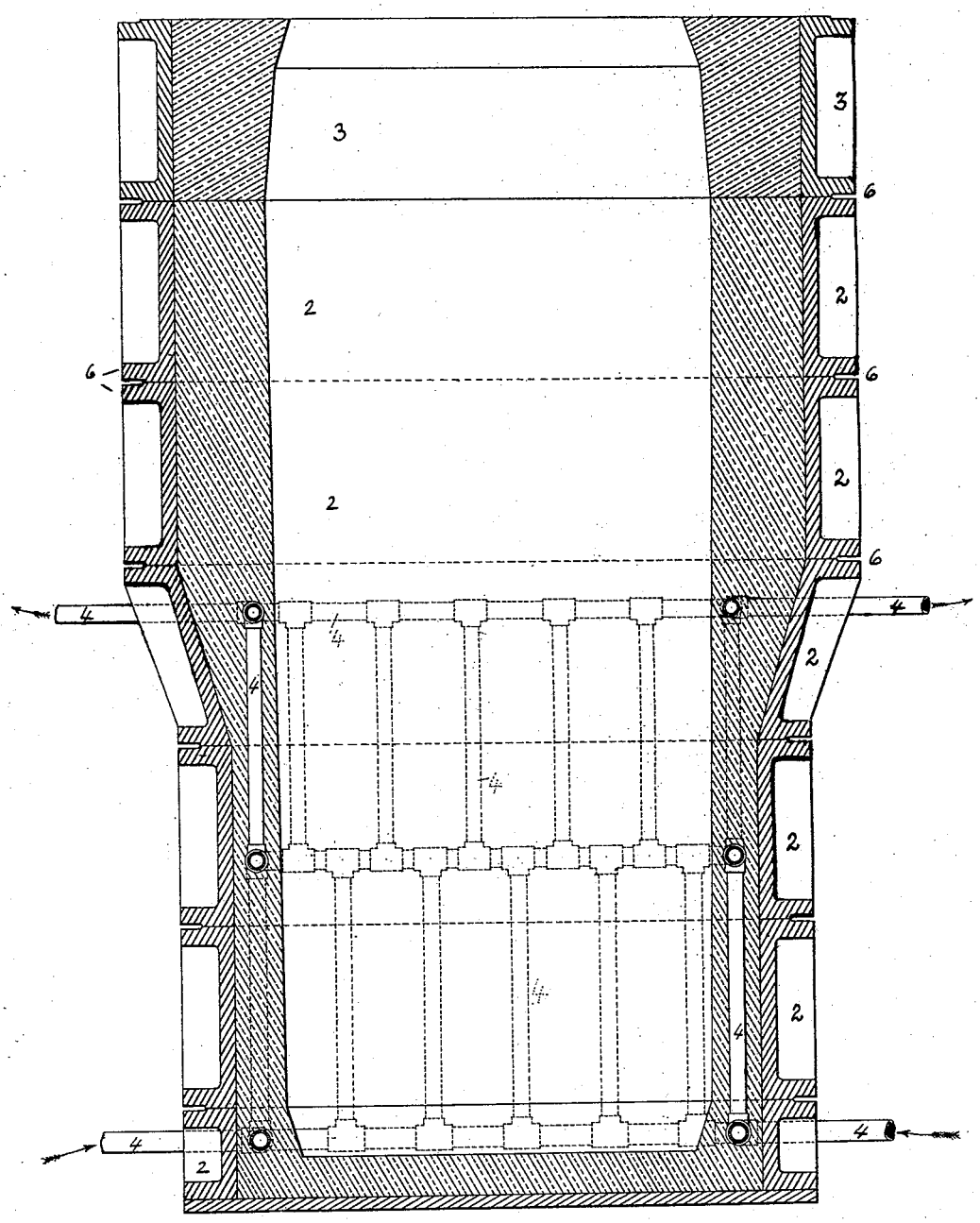
(No Model.)

T. KAYE.

APPARATUS FOR CASTING INGOTS.

No. 491,213. Patented Feb. 7, 1893.



WITNESSES

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UNITED STATES PATENT OFFICE.

TIMOTHY KAYE, OF HOMESTEAD, PENNSYLVANIA, ASSIGNOR OF ONE-FIFTH TO JOHN G. OEFFNER, OF SAME PLACE.

APPARATUS FOR CASTING INGOTS.

SPECIFICATION forming part of Letters Patent No. 491,213, dated February 7, 1893.

Application filed November 30, 1891. Serial No. 413,554. (No model.)

To all whom it may concern.

Be it known that I, TIMOTHY KAYE, of Homestead, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Casting Ingots, of which the following is a full, clear, and exact description.

In casting large steel ingots, such as are used in the manufacture of armor-plates, &c., difficulty has been experienced in preventing the metal in cooling from so contracting as to form cavities in its center. Such cavity constitutes a flaw in the metal, and impairs the value of steel plates rolled from the ingots.

It is the object of my invention to prevent this difficulty, and to enable an ingot to be cast sound and without central flaws.

It is a further object of my invention to provide a sand-mold suitable for casting ingots, and to construct it so that it can be employed more than once without remolding.

To this end my invention consists in an ingot mold having at its lower portion cooling devices, such as water-circulatiing pipes, so arranged that the ingot when cast shall cool more rapidly at the base than at the upper part. I have discovered that when such means are used, the more rapid solidification of the lower part of the ingot prevents the metal from separating at the center, and causes the ingot simply to pipe in the natural manner at the top.

The invention also consists in the method of casting, in which the cast metal is cooled more rapidly at its lower part than at the upper part.

It also consists in an ingot-mold, made of sand, the cavity being tapering or wedge-shaped, narrowest at the bottom, and increasing in width toward the top, there being a top section, which is removable, and is preferably tapered in the opposite direction, so as to facilitate its removal from the remainder of the mold.

The accompanying drawing shows my improved mold in vertical central section.

The mold-frame, which is upright in position, is composed of a series of superposed flasks 2, 3, having cavities adapted to register with each other, and preferably made in sections and constructed with flanges to give them the required strength.

In molding the sand within the flasks, I insert a central upright pattern, which is of tapering shape, increasing in width and thickness from the bottom toward the top. Having inserted this pattern, the sand is packed tightly around it within the flasks. The top mold section 3 is molded separately within its flask, so that the cavity instead of tapering downwardly as in the lower flasks, tapers in the opposite direction. The horizontal flanges 6 of the flasks shown in the drawing enable them to be bolted or clamped securely together. Embedded within the sand at the lower part of the mold are pipes 4, through which a cooling medium, such as a stream of water, steam or air may be caused to pass from and to supply exit branches which pass through the flasks as shown in the drawing.

The sand material used in forming the mold consists preferably of a mixture of sand, German clay and molasses or other binder, though other suitable sand material may be employed. When the mold is thus prepared, and dried, the steel may be teemed into the matrix. Steam or water being passed through the pipes 4, cools the lower part of the ingot more rapidly than the upper part, and as before explained, causes the solidification of the metal to begin at the base, and prevents the formation of central cavities or flaws.

When the metal has solidified, it may be removed without destroying the mold, by lifting off the top flask 3, thus exposing the upper end of the ingot, which can be grasped by tongs and thus lifted from the mold, the tapering shape of whose cavity offers no resistance to such removal. The top flask may then be replaced and the mold made ready for another cast.

Various modifications may be made in the construction of the apparatus. For example, the lower part of the mold may be cooled by other means than by water pipes; and the mold flask may be formed otherwise than as shown in the drawing.

The claims relating to the cooling of the lower part of the mold are not limited to the use of a sand-mold.

The advantages of my invention will be appreciated by those skilled in the art. By means of my improvements, I improve the quality of the ingots, and effect a considerable saving in expense.

I claim:—

1. A molded ingot mold having a matrix with downwardly-converging sides, and means for cooling the lower portion of the mold, substantially as described.

2. A molded ingot mold having a matrix with downwardly-converging sides and cooling pipes embedded in the lower portion of the mold, substantially as described.

3. A molded ingot mold, having a matrix with downwardly converging sides, a removable top section, and means for cooling the lower portion of the mold; substantially as and for the purposes described.

4. A molded ingot mold, having a matrix with downwardly converging sides, a removable top section tapering in the opposite direction, and means for cooling the lower portion of the mold; substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 25th day of November, A. D. 1891.

TIMOTHY KAYE.

Witnesses:
W. C. MILLER,
C. H. STEWART.