

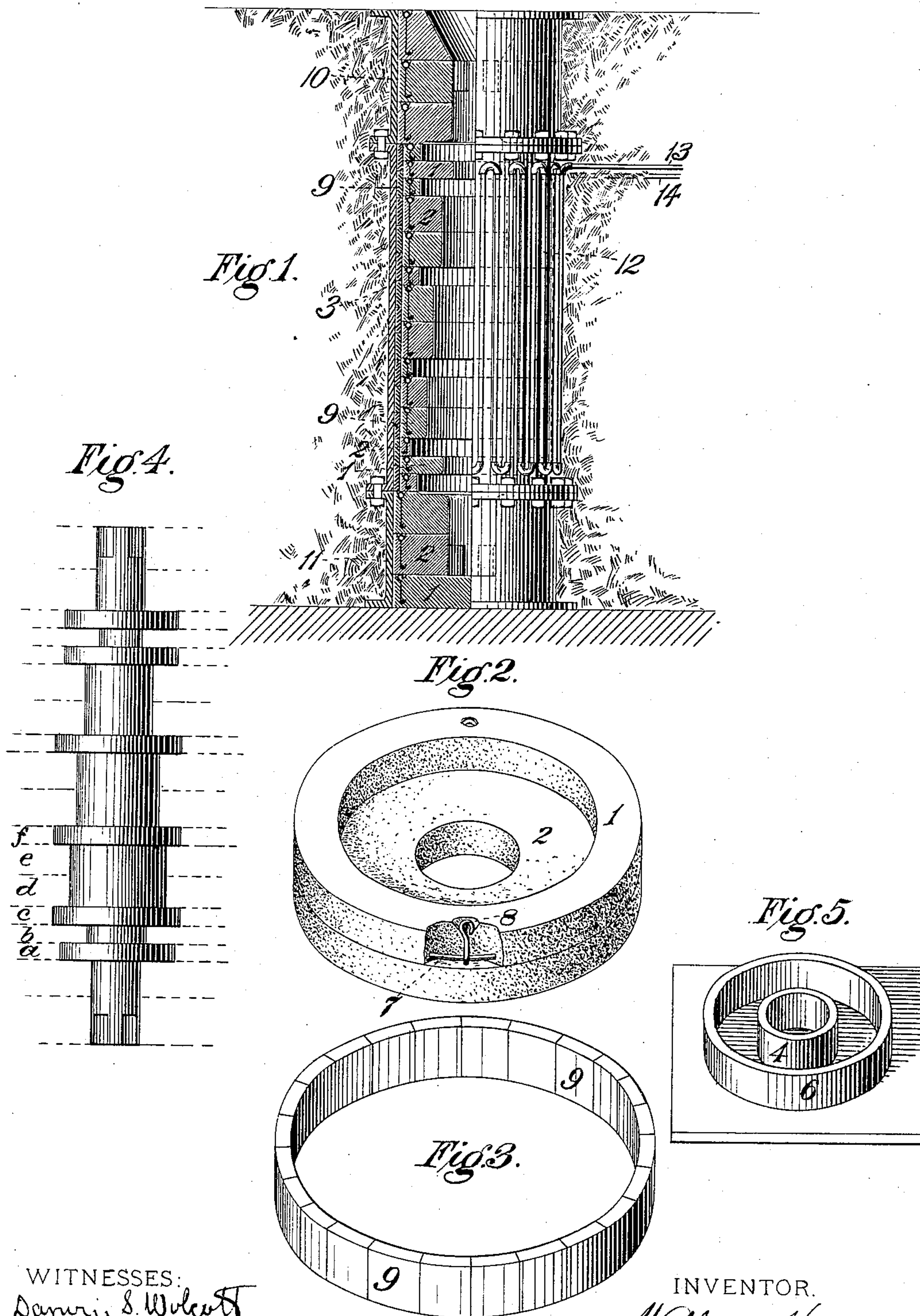
(No Model.)

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MOLD FOR CASTING ROLLS AND OTHER ARTICLES.

No. 323,807.

Patented Aug. 4, 1885.



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# UNITED STATES PATENT OFFICE.

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## MOLD FOR CASTING ROLLS AND OTHER ARTICLES.

SPECIFICATION forming part of Letters Patent No. 323,807, dated August 4, 1885.

Application filed May 21, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HAINSWORTH, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Molds for Casting Rolls and other Articles, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a view in side elevation, partly in section, of my improved mold for casting rolls and other similar articles. Fig. 2 is a perspective view of two of the rings on sections composing said molds. Fig. 3 is a similar view of the metal sections employed for supporting or bracing the mold-sections externally. Fig. 4 is a diagrammatic view showing the manner of dividing a roll so as to form patterns of separate parts thereof. Fig. 5 is a view of the core-box with the pattern of one part of the roll in place therein.

The invention herein relates to certain improvements in molds employed in casting rolls or other similar articles having irregular surfaces. It has heretofore been generally customary in making rolls to first form a pattern of the same, said pattern conforming in size and shape to the roll. This pattern is then placed within a flask, and sand or other suitable material packed therein around the pattern. In such an arrangement it is necessary that the flask, mold, and pattern should divide or separate longitudinally, in order that the pattern may be removed from the mold. This construction of mold is objectionable on account of the formation of longitudinal fins on the casting, it being practically impossible to make the joint between the two parts of the mold sufficiently tight to prevent the molten metal from flowing into said joint, thereby forming fins which are difficult to remove. It has been attempted to overcome the above objection by "sweeping" up a mold in a flask; but this method, while obviating the formation of longitudinal fins, proved very slow and expensive, and the resulting mold is imperfect owing to the sand being loosely packed. A very serious objection to both of the above methods arises from the fact that molds for large castings require drying or baking before they can

be used, and this drying or baking not only requires large ovens, but also a considerable time, on account of the size of the mold. A still further objection to the first method arises from the necessity of constructing an entirely new pattern for every change in the form or location of the grooves in the roll. The object of my invention is to so construct a mold that the formation of longitudinal fins is entirely avoided, and that the material composing the mold may be sufficiently and conveniently packed, and that any alterations in the form or location of the grooves or collars may be easily effected, and also to provide for the bracing or supporting of the back of the mold and the free ventilation of the same; and to these ends my invention consists in the construction and combination of parts, substantially as hereinafter described and claimed.

The mold proper consists of a series of rings, 1 and 2, of varying inner diameters, superposed one upon the other, with a metal flask or cylinder, 3, in such order as to produce, when the mold is completed, a matrix having the desired internal configuration.

In making a mold for a roll, the latter is divided into a series of sections, as *a b c d*, &c., Fig. 5, and a pattern, as 4, of each section is then made. One of these patterns, as 4, for the section *a*, is then placed centrally within what I term a "core-box," 6, and then between the core-box and pattern is packed any suitable molding material. The pattern is then withdrawn, and the ring or annulus thus formed is removed to an oven to be dried. After the formation of the mold for the section *a*, the pattern for the section *b* is placed in the same core-box 6, or one having the same internal diameter, and a mold for the section *b* of roll is formed. These steps are continued until a mold for each section into which the roll has been divided has been formed, as will be clearly understood. In forming these mold-sections 1 and 2 a ring, 7, is incorporated therewith, as shown, for the purpose of strengthening and bracing the mold-ring, and to these strengthening-rings 7 are attached the handles 8 for convenience in handling the mold-sections, care being taken that said handles do not project beyond the surface of the mold. The mold-rings thus formed are, after being properly dried, arranged in proper order



within the flask or cylinder 3, and between these mold-rings and the flask are placed a series of iron blocks, 9, which are made of uniform thickness and of a length equal to the thickness of the mold-rings; or in lieu of making these blocks of a length equal to the thickness of the mold-rings, they may be made shorter, provided that the combined length of two or more blocks placed upon the others shall not be greater than the thickness of the ring behind which they are located—that is to say, the block behind one ring should not extend behind adjacent rings above or below, as otherwise they would interfere with the independent movements of the mold-rings. As the external diameters of the molds are all equal, said rings being formed either in the same core-box or core-boxes having the same internal diameter, the blocks 9, which, as above stated, are of uniform thickness, will properly center the mold-rings in the flask 3. After the main portion of the mold has been formed as above stated, the portions of the mold for the formation of the gudgeons and sinker-head are prepared. These portions are formed in the cylinders 10 and 11, either by packing sand or other molding material around a pattern placed in the cylinders, or, and as I prefer, they may be made in a manner similar to that employed in forming the main portion of the mold, as above described; but the supporting and centering blocks 9 need not be used with these portions of the mold.

Around the exterior surface of the shell or cylinder 3 are arranged a series of pipes, 12, connected together, the ends of the series being provided with suitable outlet and inlet pipes, 13 and 14, and during the casting operation cold water is caused to circulate through these pipes for the purpose of carrying off the heat from the shell or cylinder 3. As the mold-rings 1 and 2 are placed in position, the joint between each adjacent ring is carefully luted to prevent the molten metal from entering such joints.

As the molten metal enters the mold, the heat thereof will cause the mold-rings to expand, and unless they are externally braced the expansion might be sufficient to rupture the rings. Such excessive expansion, however, is prevented by the blocks 9, which are caused to expand by the heat transmitted thereto through the mold-rings. The expansion of these metal blocks is considerably greater than that of the mold-rings 1 and 2, and as the shell

or cylinder is kept comparatively cool by the water-coils 12, and hence has very slight expansion, the expansion of the metal blocks will effect an inward pressure upon the mold-rings, and will consequently not only prevent any fracture of the rings, but will cause them to press upon and, as it were, follow up the cooling and contracting metal in the mold.

The metal blocks arranged behind each ring should be slightly separated, so as to permit of expansion peripherally, without causing them to bulge away from the face of the mold-ring, and the aggregate lengths of the blocks should be a little less than the length of the cylinder 3, thereby providing for their longitudinal expansion without distortion.

In molding articles in which several sections are similar in form and size, as the sections *d* *e* or *c* *f* in Fig. 1, the same pattern may be employed in forming the mold-rings for corresponding parts of the mold, as will be clearly understood.

The blocks 9, arranged as above stated, not only serve to center and support the mold-rings within the shell, but being arranged in open order, as stated, afford means for the escape of gases from the mold.

In some instances a longitudinally-split metal cylinder or a series of split metal rings may be interposed between the shell and the mold-rings, or any other suitable means may be employed, which by expansion will brace the mold-rings externally, thereby preventing their undue expansion and rupture.

I claim herein as my invention—

1. A mold having in combination a retaining shell or cylinder, a series of separately-molded sections arranged within said shell and forming the mold cavity or matrix, and a series of metal blocks arranged between the shell and the molded sections, substantially as set forth.

2. A mold having in combination a retaining shell or cylinder, a series of separately-molded sections arranged within said shell, a series of metal blocks arranged between the shell and molded sections, and means for preventing the expansion of the retaining-shell, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM HAINSWORTH.

Witnesses:

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DARWIN S. WOLCOTT.