

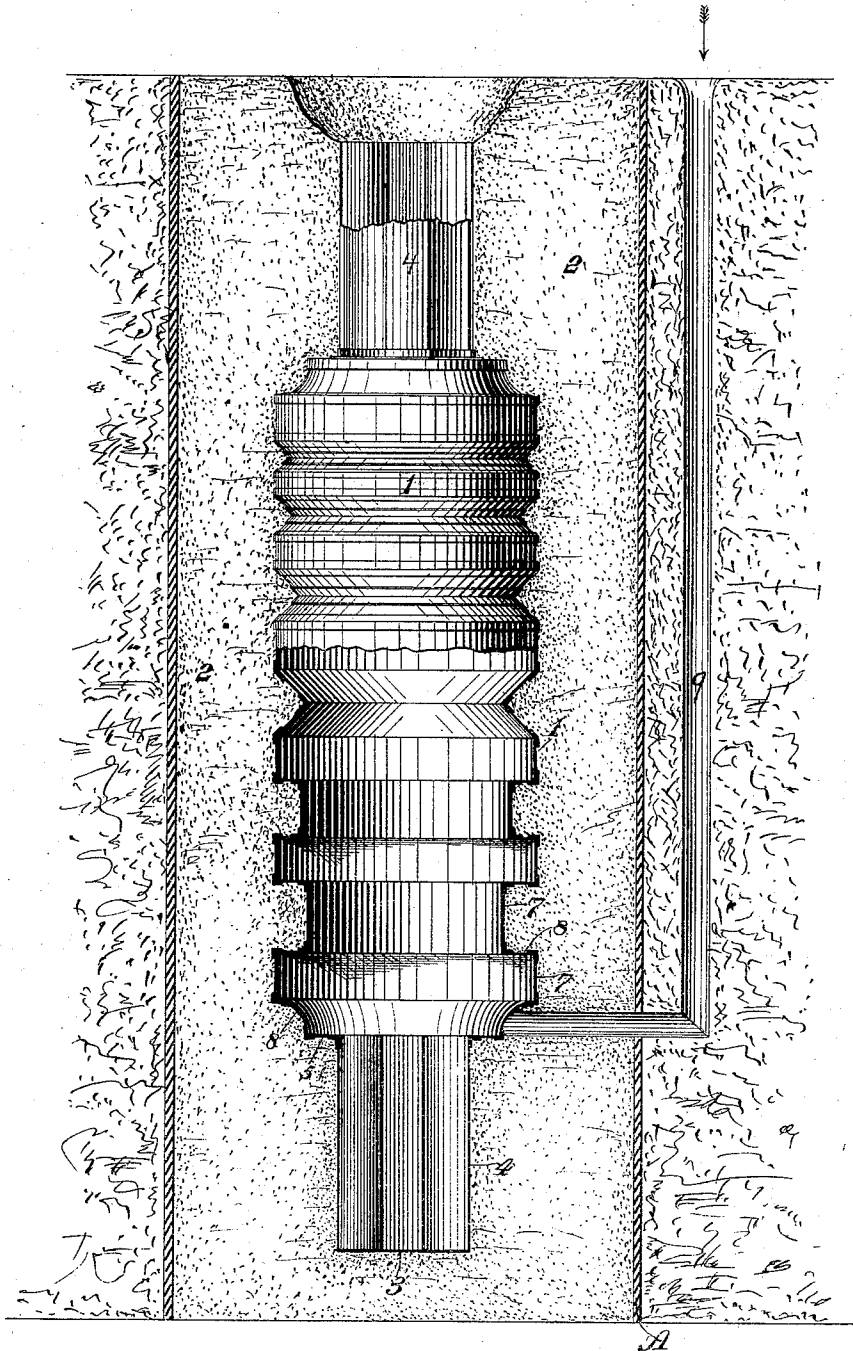
(No Model.)

J. HEMPHILL.

CASTING ROLLS.

No. 317,781.

Patented May 12, 1885.



WITNESSES:

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CASTING ROLLS.

SPECIFICATION forming part of Letters Patent No. 317,781, dated May 12, 1885.

Application filed August 6, 1884. (No model.)

To all whom it may concern:

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

In the accompanying drawing, which makes part of this specification, the figure is a sectional elevation of a mold for casting grooved rolls.

Heretofore in casting grooved rolls and similarly-shaped articles—*i. e.*, articles having an irregularly-shaped surface—the mold therefor has been usually formed of sand or some rigid material, as cast-iron. The sand molds are formed by packing sand while in a moist condition around a suitable pattern, and after the pattern has been removed the mold is placed in an oven and thoroughly dried. Great difficulty is experienced in the use of such a mold, arising from the liability of the inwardly-projecting parts being broken off by the molten metal as it rises in the mold during the casting operation, such broken parts becoming incorporated in the body of the roll, thus causing defects which cannot be removed; or if the sand of the mold be packed and dried so hard as to overcome all liability of any of the parts being broken there is danger of the mold being so rigid and unyielding that parts of the roll will be broken by the contraction of the metal in cooling. The same liability of fracturing the article being cast during the cooling of the metal is encountered in the use of thick metal molds, and such metal molds are rapidly destroyed by contact with the molten metal. In addition to the breaking down of inwardly-projecting parts of the sand mold, as above stated, the molten steel, which is poured while in a very fluid condition, filters into the sand of the mold, and solidifying while mingled with the sand forms a hard and tenacious crust around the body of the metal, which is extremely difficult to remove; and, moreover, it frequently occurs that pockets or holes containing sand from broken parts of the mold will be discovered during the turning operation, and if these pockets are of considerable size the article will be unfit for use,

and must either be discarded or turned down to form a smaller article; but this entails great expense and is seldom resorted to. It is obvious that the above obstacles and difficulties greatly enhance the cost of production.

The object of my invention is to obviate the above difficulties in the manufacture of grooved rolls and other articles having irregularly-shaped surfaces—*e. g.*, cannon-shafts, &c.—and thereby insure the uniform production of sound articles at a reduced expense; and to this end my invention consists in the construction and combination of parts, all as more fully hereinafter described and claimed.

The mold A for the roll consists of a thin sheet-metal lining, 1, and a backing or filling, 2, of dry sand. The sheet-metal lining 1 is constructed of a series of sections, said sections being riveted or secured together in any suitable manner. The sections 3 are simple circular plates and are riveted to the cylindrical sections 4, said sections forming the lining of the top and sides of that part of mold in which the journals of the roll are formed. To the open end of the cylindrical sections 4 are riveted the annular sections 5, which line the sides of the parts of the mold which form the ends of the body of the roll. The alternate recesses and projections of the mold for grooved rolls are lined or covered by a series of sections, 7 and 8. The sections 7 for the bottom of the recesses and the tops of the projections are shaped, as shown, with flanges, whereby the adjoining sections 8, forming the lining for the sides of the recesses or projections, are connected to the sections 7.

The shape of the various sections may be altered to suit the various shapes of grooves and collars desired in the finished roll, and in place of forming the lining for the body or working part of the roll of a number of sections, it may be formed of one cylindrical piece transversely corrugated to approximate the shape of the finished roll.

A shell constructed as described is placed in a suitable flask, and the backing 2, of dry sand or other suitable yielding material, is packed around the same. Into the mold thus constructed the molten steel is cast through the runner 9 in the usual manner. The molten

steel will fuse the inner surface of the sheet-metal lining, thus welding the two together; but the shell should be made of such a thickness that the molten steel will not burn through the lining and come in contact with the sand backing, and that said lining will not be entirely fused. It will be observed that all the inwardly-projecting parts have sufficient tenacity to prevent their being broken or disturbed in filling the mold, and at the same time all the parts of the mold have sufficient elasticity to allow of their yielding under the pressure exerted by the contracting metal, and as the lining is made of such thickness that the molten steel will not burn through and come in contact with the sand backing, the casting will come from the flask clean and smooth, ready for any subsequent treatment. The lining is then removed and the casting turned to final shape and size, this turning operation being effected with very little difficulty, as there will be nothing to remove but metal free from grit or sand.

I do not wish to be understood as limiting myself to special form or shape of lining, as that may be varied to suit the shape of the working-face of the rolls or other article to be produced, the essential feature of my method being to keep the molten steel from contact with the sand backing of the mold, so as to produce a casting having a surface when withdrawn entirely clean and free from sand or any gritty crust.

Although I have shown and described my improved mold as applied to the manufacture of rolls, I do not limit myself thereto, as said mold may be used in the manufacture of other articles—as shafts, cannons, &c.—the shape

of the lining or shell being changed to suit the article to be produced, the prominent characteristic of my invention being a mold constructed to prevent any injury to any projecting parts and to allow of freedom of movement of the parts of the mold under the pressure of the cooling metal, and also to provide for the production of a casting having a surface clean and free from grit or sand and ready for any subsequent treatment; nor do I limit myself to removing the shell and bringing the article to final shape by cutting, as the same may be effected by grinding in the well-known manner.

I claim herein as my invention—

1. A mold for the production of articles having irregular surfaces, consisting of a sheet-metal shell corresponding in size and shape to the article to be cast, and constructed to yield longitudinally under the pressure of the contracting metal, and a backing of dry sand or other suitable yielding material, substantially as set forth.

2. A mold for the production of grooved rolls, consisting of a sheet-metal shell having its interior of a size and shape corresponding to the exterior of the roll to be cast, and constructed to yield longitudinally under the pressure of the contracting metal, and a backing of dry sand or other suitable yielding material surrounding such shell, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES HEMPHILL.

Witnesses:

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