G. W. Bollman & Neemes.

Casting Rolls, &c.

No. 50,680. Patented Oct. 31, 1865.

Fig. 2.

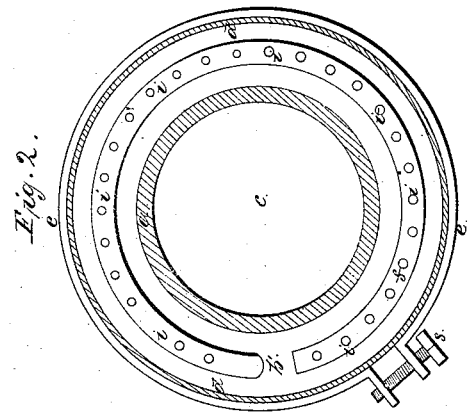
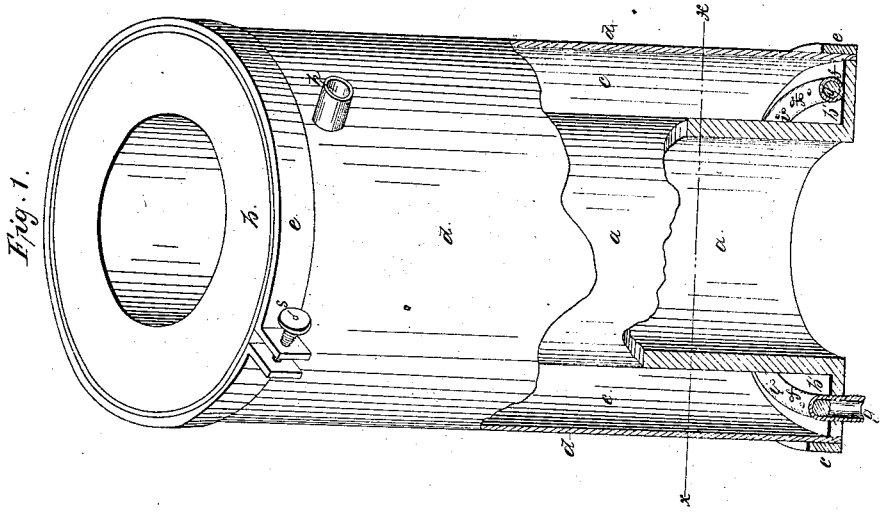


Fig. 1.



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UNITED STATES PATENT OFFICE.

GEORGE W. BOLLMAN AND WILLIAM NEEMES, OF PITTSBURG, PA.

IMPROVEMENT IN MAKING CHILLED CASTINGS.

Specification forming part of Letters Patent No. 50,680, dated October 31, 1865.

To all whom it may concern:

Be it known that we, GEORGE W. BOLLMAN and WILLIAM NEEMES, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Making of Chilled Castings; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective representation of a chill for casting chilled rolls, the lower part being represented as broken away to show the interior. Fig. 2 is a horizontal section of the chill through *x x*, Fig. 1, showing the interior of the chill.

In the several figures like letters denote similar parts.

In the manufacture of rolls for rolling metals and other articles which are designed to have a surface harder and susceptible of a finer polish than ordinary cast-iron, it is usual to cast the body of the roll, or that part of the casting which is to be hardened, in a chill. This chill consists (in the case of casting rolls) of a heavy hollow iron cylinder, the cavity of which is of the shape and size of the body of the roll to be cast in it, the necks of the roll at each end being cast in sand-molds in flasks attached to the chill. These rolls are cast with the axis of the chill in a vertical position. The effect of the chill is to abstract the heat rapidly from the surface of the metal cast in it, so as to cool it so much the more rapidly on the surface than in the interior of the casting as to form a hard crust outside, or, as it is called, a "chilled" surface.

The difficulty encountered in casting rolls in a chill is that as the large mass of iron composing the chill becomes heated by the molten metal which it contains it expands considerably, thus increasing the diameter of its cavity, not, however, until it has formed a thin hard crust or skin on the surface of the casting. This crust is too thin and weak to retain its shape unless supported by the sides of the chill, owing to the great pressure of the mass of yet fluid metal in the interior of the crust; but as the chill expands it leaves the surface of the casting, which bursts, allowing the melted metal to run more or less into the space thus formed, and the result is that the roll is ruined. This does not always occur, but it happens so frequently, and is so difficult to be prevented, as to increase greatly the cost of manufacture of chilled rolls, especially those of large diameter. The same difficulty occurs, although not to a like extent, in casting railroad-car wheels, the tread of which is cast against a chill, and other lighter articles of chilled castings; but in these comparatively lighter articles there is the additional difficulty of the warping of the chill from the heat and the consequent misshaping of the casting.

These obstacles to the successful manufacture of chilled rolls and other chilled castings it is the object of our invention to overcome; and we attain this result by casting articles which are to be chilled in a thin metallic chill and surrounding the chill with water, whereby the chill is kept sufficiently cool to prevent its expanding so much as to damage the casting, and the depth of the chilled surface may be increased.

To enable others skilled in the art to use our improvement, we will proceed to describe its use and operation as applied to the casting of chilled rolls.

The several figures of the drawings represent the chill which we use, in which *a* is the chill, which is a hollow cast-iron cylinder, the interior diameter (or cavity) of which is the size of the body of the roll to be cast in it. To this the flasks for casting the neck of the rolls are attached in the usual manner. The chill, instead of being, as is usual, six or seven inches in thickness all round, is only from one to two inches thick.

Around the circumference of the chill, at the top, is a flange, *b*, cast together with the chill, and around the bottom of the chill is a similar flange, *b'*, of the same width. These flanges *b b'* form the top and bottom of the cavity *c*, which is formed around the chill *a* by a cylindrical casing, *d*, made of boiler-plate, which may be riveted to the flanges *b b'* or held in place, as shown in the drawings, by a band, *e*, at each end of the chill, drawn tightly around the casing over the flange by a clamp-screw, *s*.

In the bottom of the cavity *c* of the chill, resting on the lower flange, *b'*, and extending

around it, is a pipe, *f*, one end of which connects with a short pipe, *g*, which enters the cavity around the chill through the lower flange, *b'*, and the other end of which reaches nearly to the pipe *g*. The pipe surrounding the chill, as before stated, is open. The circular pipe *f* has holes *i* bored in its upper side at short intervals all around, so as to admit the water at various points. At the upper end of the chill is an exit-pipe, *h*.

The chill, being thus constructed, is operated as follows: When the roll is to be cast in it, and while the molten metal is being poured in, a stream of cold water is admitted from below through the pipe *g*, which traverses the circular pipe *f*, passing out at the open end, and also at all the intermediate holes, *i*. The object of introducing the water through the circular perforated pipe *f* is to prevent it striking the side of the chill at one point and cooling it irregularly. The water thus flowing in at the bottom of the chill passes out at the exit-pipe *h* at the top, and the continual stream serves to carry off the heat from the chill, keeping it sufficiently cool to prevent any undue expansion, and also aiding materially in chilling the surface of the casting.

The thickness of the chill will depend on its diameter or the size of casting to be made in it. The rapidity with which the cold water is caused to flow through the cavity *c* of the chill will regulate the degree of chill to be given to the casting.

In casting car-wheels or any other castings to be chilled hollow chills are to be used through the cavity of which a stream of water is allowed to pass in the manner substantially as hereinbefore described.

In place of surrounding the chill with a casing, *d*, and passing a current of water around it it may be immersed in a reservoir of water, although the plan described is preferable.

We are aware that hollow flasks have been used for the purpose of heating the mold in which the casting is made, and we do not claim, broadly, the use of such hollow flasks or molds; but

What we do claim as our invention is—

The use of thin metallic molds or chills for making chilled rolls, shaftings, and other large castings when the exterior of the chill in which the casting is formed is surrounded with cold water for the purpose of abstracting the heat from the surface of the roll, thus preventing the warping of the chill and of chilling the casting from the surface more rapidly and to a greater depth, a constant stream of cold water being applied to take the place of that which, having become heated, is allowed to escape, in the manner substantially as hereinbefore described.

In testimony whereof we, the said GEORGE W. BOLLMAN and WILLIAM NEEMES, have hereunto set our hands.

GEO. W. BOLLMAN.
WILLIAM NEEMES.

Witnesses:
DAVID MCKEE,
JOHN POLLOCK.