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W. BRINTON.
METHOD OF FORMING CASTINGS.
APPLICATION FILED APR. 8, 1902.

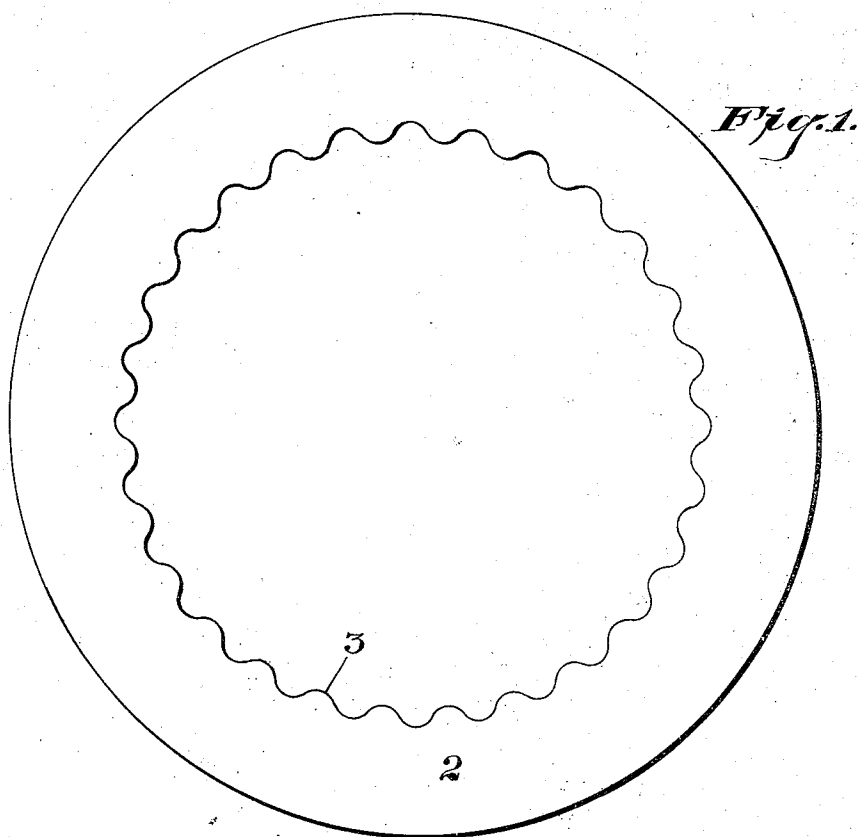


Fig. 1.

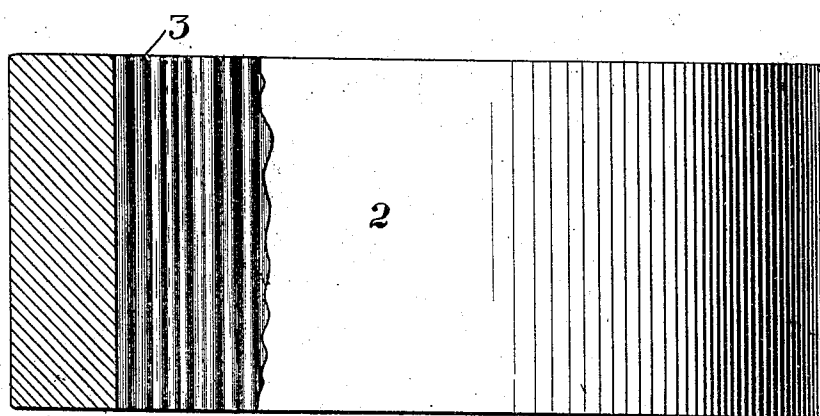


Fig. 2.

Witnesses:

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UNITED STATES PATENT OFFICE.

WALTER BRINTON, OF HIGH BRIDGE, NEW JERSEY.

METHOD OF FORMING CASTINGS.

No. 816,709.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER BRINTON, a citizen of the United States, residing at High Bridge, in the county of Hunterdon and State of New Jersey, have invented certain new and useful Improvements in Methods of Forming Castings, of which the following is a specification.

This invention relates to the formation of castings, the object of the invention being to provide an improved casting—such, for instance, as a roll-shell for crushers—and to an improved method of forming the same, whereby in the heating of such castings a more uniform expansion and in cooling a more uniform contraction thereof is obtained, thus preventing abnormal and irregular strains and subsequent cracking of the castings.

It is frequently desirable to subject castings to heat treatment, particularly manganese-steel castings, for the purpose of toughening them. It is well known that when a solid mass of metal, which conducts heat relatively slowly, is heat-treated the interior will be heated or cooled much more slowly than the exterior, and if rapid cooling is desired the interior will in consequence receive less benefit than the exterior. This is particularly true of manganese steel, which to be serviceable should ordinarily be cooled rapidly and uniformly throughout the mass, this steel ordinarily tending to cool irregularly on account of its extraordinary poor heat conductivity. Therefore it is necessary to have the casting heated and cooled uniformly throughout, so that its expansion and contraction under the heating and cooling thereof, respectively, will be uniform, thereby preventing abnormal and irregular strains and subsequent cracking of the casting, and I have discovered that by providing a hollow casting with an irregular surface on its interior superior results are obtained in the heat treatment thereof. In order to get the full benefit of the treatment, manganese-steel castings after being heated are cooled quickly, generally by immersion in a cooling fluid or bath, the effect of which is to rapidly absorb the heat from the surfaces of the casting. If such casting is in the form of a ring or cylinder of the ordinary thickness of a roll-shell, such surface cooling effect causes a rapid contraction of the part so affected, while the interior body of metal between the surfaces still contains a much higher degree of heat and is therefore con-

tracting much more slowly. It is therefore readily seen that during the whole process of treatment the interior heat must be absorbed through that part of the casting which has been more directly and rapidly affected by the cooling contact. It is also conceded that a plane inner surface of a cylindrical or circular casting forms a very rigid arch, and as this surface is first affected in cooling therefore a perfectly rigid arch is set up, the later contraction of the interior body of metal over said resistance of arch being sufficient to cause internal strains to develop in the later cooling body of steel. The resistance of the inner surface of the ring or cylinder provided with corrugations or broken surfaces while in a semiheated state does not set up such a rigid arch as does the plane surface. The diffusion of the interior heat of the casting radiating through these corrugated or broken surfaces also has a tendency to assist in the distribution and better equalization of the interior heat.

In the drawings, accompanying and forming part of this specification, Figure 1 is a top view of a roll-shell for crushers with the interior surface thereof corrugated. Fig. 2 is a side view thereof, partly in section.

As a preface to a further description of this improved casting and the method of forming the same it will be understood that this method is applicable to all kinds of castings formed of manganese steel or otherwise, and it is particularly well adapted for roll-shells for crushers.

To illustrate the present improved method, I have shown in the drawings a roll-shell for crushers, and in practice to facilitate the heat treatment and secure superior results in the uniform expansion and contraction thereof during the heating and cooling, respectively, of this shell I provide such shell with an irregular surface—such, for instance, as a corrugated surface 3—this surface being formed during the casting of the shell. This irregular surface is in the present instance formed on the interior of the shell. Practical experience has demonstrated that these corrugations are advantageous, since there is less likelihood of internal strain setting up in the casting while it is absorbing heat and also less likelihood of the casting being affected by such strains while it is giving up heat or cooling, so that abnormal or irregular strains and subsequent cracking of the casting is

avoided. These corrugations constitute a means for securing a more thorough distribution and equalization of the heat during the absorption thereof and for insuring the giving off of the heat uniformly during the cooling of the casting. The corrugations, it is believed, afford increased surface exposure of the castings, which thus assists the more equal distribution of heat throughout such castings, also the giving off of the heat during the cooling thereof. Furthermore, owing to the corrugations it is believed that there is less rigidity of the castings at critical periods of expansion and contraction during the heat treatment, there being less likelihood of rigid and intense arches of resistance setting up in the broken lines than there would be in straight plane surfaces.

Having described my invention, I claim—

1. The method of producing a body of annular section, consisting in casting it in a form in which the area of the inner surface is greater than the area of the outer surface of the body, and then subjecting the body to heat and then cooling it.

2. The method of producing a body of annular section, consisting in casting it in a form in which the outer face is substantially circular in transverse section, and the inner face is substantially sinusoidal in transverse section, thereupon subjecting the body to heat and then cooling it.

WALTER BRINTON.

Witnesses:

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PERCIVAL CHRYSTIE.