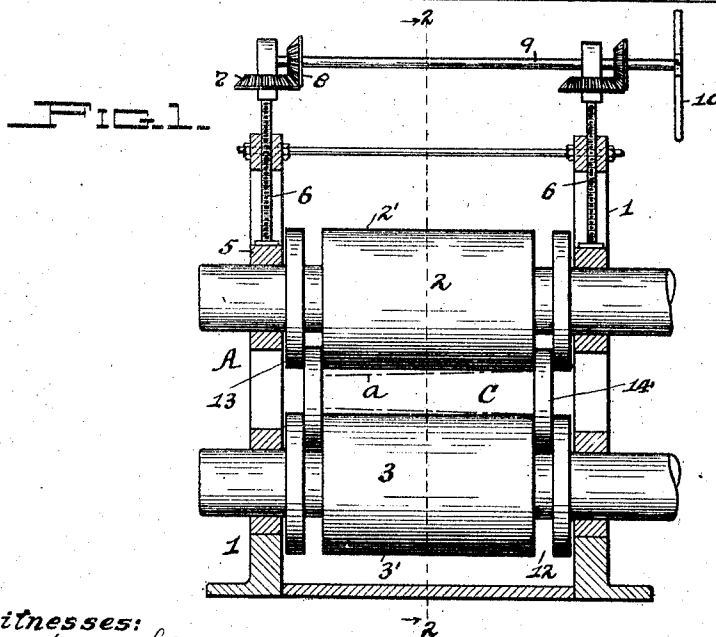
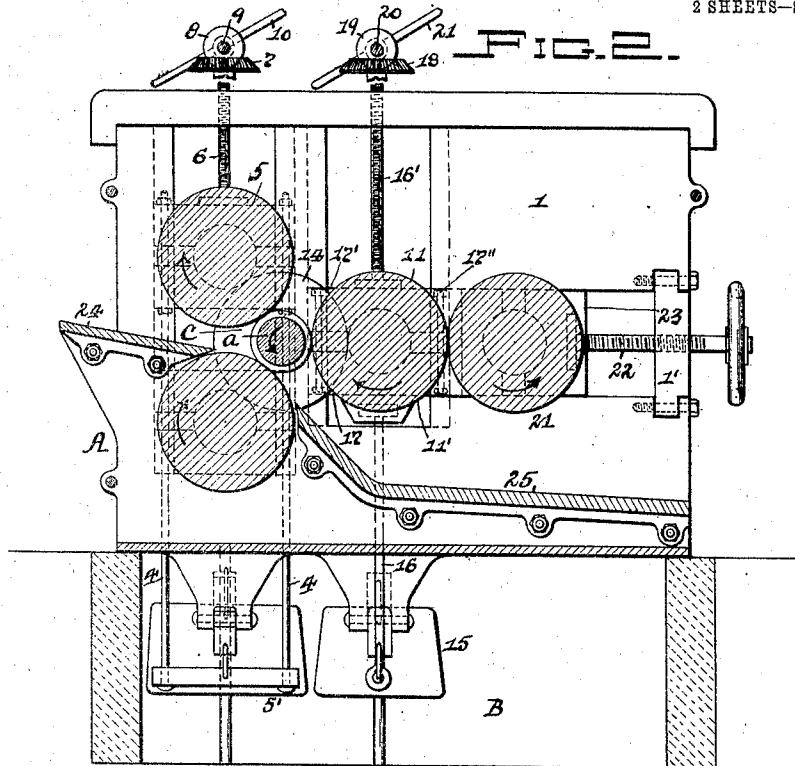


J. C. RUSSELL.
TREATING METAL ARTICLES.
APPLICATION FILED APR. 29, 1911.

1,019,191.

Patented Mar. 5, 1912

2 SHEETS—SHEET



Witnesses:
J. B. Humphries,
O. L. Thompson,

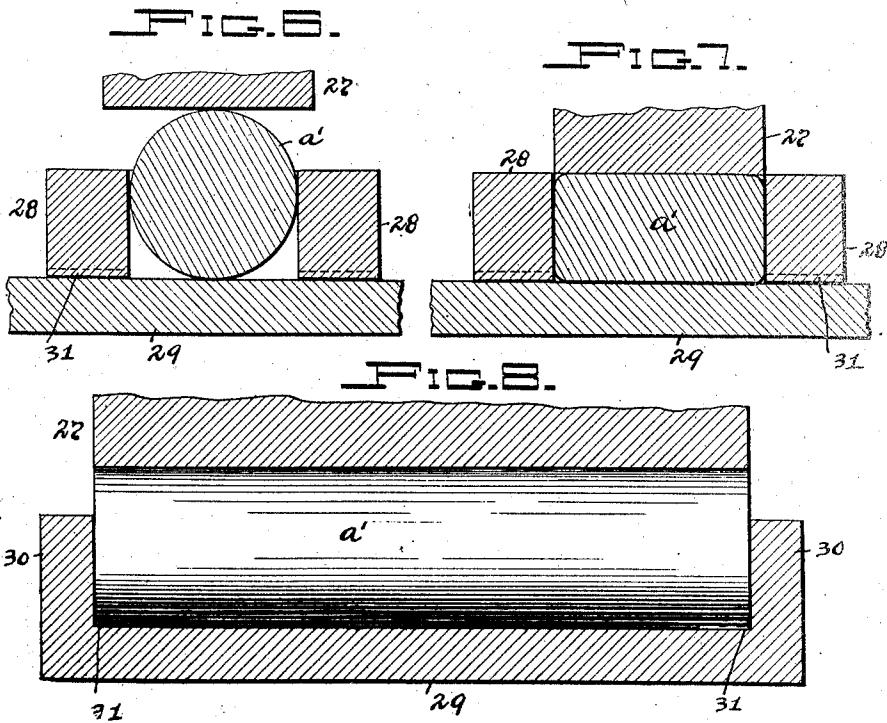
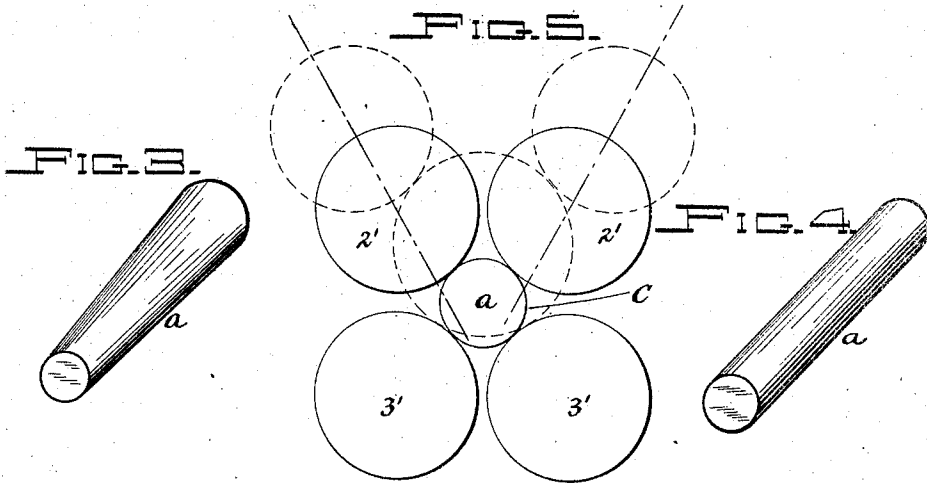
Inventor:
James C. Russell,
By J. W. Cooley
attorney

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J. D. Humphreys
O. L. Thompson.

Inventor:
James C. Russell,
By J. W. Brooks,
Attorney.

UNITED STATES PATENT OFFICE.

JAMES C. RUSSELL, OF PITTSBURGH, PENNSYLVANIA.

TREATING METAL ARTICLES.

1,019,191.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed April 29, 1911. Serial No. 624,193.

To all whom it may concern:

Be it known that I, JAMES C. RUSSELL, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Treating Metal Articles; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the treating of cast metal articles, and has special reference to what are known as cast steel ingots.

The object of my invention is to provide a cheap, simple and efficient method for the treatment of cast steel ingots, whereby such an ingot will be so formed or cast and treated as to eliminate the piping, blow-holes, hollows or segregations usually formed in the same and the ingot so treated will be of a solid homogeneous mass of metal throughout.

To these ends my invention consists, generally stated, in the novel method employed, as hereinafter more specifically set forth and described and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to practice my improved method, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a vertical section of the apparatus for carrying out my invention showing the rolls in full lines. Fig. 2 is a vertical central section of the same on the line 2—2, Fig. 1 and looking in the direction of the arrow. Fig. 3 is a perspective view of the ingot as formed or cast in molding and before being treated. Fig. 4 is a like view of the ingot after treatment. Fig. 5 is a diagrammatic view showing a different combination of rolls. Figs. 6, 7 and 8 are views showing another manner of treating an ingot.

Like symbols of reference herein indicate like parts in each of the figures of the drawings.

In the casting operation of forming the ingot by the ordinary molding device, the ingot, such as is shown at *a* in Figs. 1 and 3 is formed round or circular in cross-section and of conical shape by its outer face being tapered throughout its length, so that after such ingot is cast and while in a semi-liquid form it is moved from its mold in the usual manner for treatment by the apparatus A, as hereinafter described.

The apparatus A comprises a rolling mill having the housings 1 on each side of the same, in which are mounted the two rolls 2 and 3, with the upper roll 2 adjustable to and from the lower roll 3 in the ordinary manner through the vertical bars or rods 4 connected to the upper journal blocks 5 for the upper roll and movably mounted in said housings and to the counter-balance 5' located in the pit B under such mill, as well as by the screws 6 bearing against said upper blocks and extending vertically above said housings, which are provided with the pinions 7 at their upper ends for meshing with the pinions 8 on the shaft 9 and such shaft being operated by the hand wheel or bar 10 at one end of the same.

Back of the rolls 2 and 3 and in line with the opening between the same is the roll 11, which is mounted in the housings 1, and each of said rolls have their main body portions 2', 3' and 11', respectively, of the usual smooth faces and circular in cross-section. The ends of the body portions 2', 3' and 11' of the rolls 2, 3, and 11 are recessed as at 12, which recesses are formed between said body portions and flange portions 13 on said rolls and are in line with each other for the reception of idle rollers or disks 14. These disks 14 are adapted to normally rest in the recesses 12 of the lower rolls 3 and 11 and form the ends of the working space C between the body portions 2', 3' and 11' of the rolls 2, 3 and 11 by their resting against the ends of said portions. The roll 11 is adjusted vertically in the housings 1 by means of the counterbalance 15 and the vertical rods 16' bearing against the upper journal blocks 17' for said roll and movably mounted in said housings, such rods extending above said housings and are provided with the pinions 18' at their upper ends, which are adapted to mesh with pinions 19 on the shaft 20 having the operating handle or bar 21 at one end of the same. The counterbalance is located in the pit B and is connected by its vertical rods 16' with the lower bearing blocks 17 for such roll 11, so that the blocks 17 and 17' can move in the housings 1 by being connected together through the bolts 17''. Bearing against the body 11' of the roll 11 is the idle strengthening roll 21 which is positioned or mounted in the rear of said roll 11 and within the housings 1. The idle roll 21 is adjusted horizontally with respect to the roll 11 by means of the

screw-rods 22 engaging with a plate 1' in the housings 1 and connected to the outer bearing blocks 23, which are movably mounted in said housings.

5 The use and operation of my improved method for treating cast metal articles, is as follows: The ingot *a* after it is taken from its mold in a semi-plastic condition is placed on the inclined table 24 in front of the rolls 2 and 3, which will allow such ingot to roll down such table and through the opening between said rolls and against the rolls 3 and 11, so that when the upper roll 2 is lowered against the ingot by shaft 9, pinions 7 and 8, and rods 6 bearing against the blocks 5 for such roll, the ingot will be confined within the working space C between the rolls 2, 3 and 11. As the rolls 2, 3 and 11 are power-driven in the usual manner and revolving in the direction indicated by the arrows it will be evident that the ingot *a* will be revolved or spun around within the space C between such rolls, so that by reason of said rolls acting on the enlarged end of said ingot through the continued adjustment of the roll 2 against the same by the means before described, such ingot will assume a complete circular form and of the same size throughout its length, while the molten metal within the same and segregations therein will be caused to be projected from such enlarged end toward the other end of the same and thus forcing out the gases in said ingot at its smaller end and sides, and any segregations at said enlarged end will be removed under the pressure of the rolls to thereby form a solid ingot throughout when thus rolled down to such circular shape. As the ingot *a* is thus formed to circular shape throughout its length by its revolving or spinning operation in the space C between the rolls 2, 3 and 11, the end rollers or disks 14 in such space and held by such rolls will act to hold said ingot within such space and engage the ends of such ingot to keep the same flat and in proper finished shape. After the ingot *a* has thus been rolled down to its desired circular shape, the roll 21 is drawn back from the roll 11 and such roll 11 raised so that such ingot can drop and roll down the inclined table 25 under said rolls to the rear of the rolling mill.

In Fig. 5 two upper rolls 2' and two lower rolls 3' are provided to form the working space C for the ingot *a*, in which case the lower rolls are placed side by side with each other in a parallel line, and the upper rolls are so mounted as to be adjusted at an angle against such ingot, so that such ingot will be revolved or spun around by the engagement of all of such rolls with the same.

In Figs. 6, 7 and 8 is shown a vertically movable die or plunger 27 and the horizon-

tally movable side dies 28 slidably mounted on a table 29 having upwardly extending ends 30. The plunger 27 and dies 28 are power operated in any suitable manner, so that when the ingot *a'* as cast in the usual manner and formed of circular shape and of the same size throughout its length, is placed on the table 29 and between the ends 30 on said table and dies 29, the plunger is lowered against said ingot, as shown in Figs. 6 and 8, which will press out such ingot and at the same time such dies are drawn out to thereby form a rectangular shaped ingot, as shown in Fig. 7, while at the same time the gases contained in such ingot are forced from within the same out through its encrusted sides so as to escape through the holes 31 in the lower part of such dies and thereby form a solid ingot.

Various other modifications and changes in the method may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

It will thus be seen that my improved method and apparatus for treating cast metal articles will enable the formation of a solid ingot of any desired size and will prevent the segregation of such ingots to thereby overcome the forming of piping, blow-holes or hollows within the ingot when cast in the ordinary manner, so that when the ingot is reduced to billets or other articles the usual waste and injurious effects in the articles formed from such ingots is overcome. The ingot as so formed or treated will permit the same to be made into disks, billets or other shapes, will also enable the same to be formed into projectiles, car wheels, axles and other articles by direct rolling or other operations thereon, and thereby overcome the usual forging operations in these classes of articles.

What I claim as my invention and desire to secure by Letters Patent is—

1. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom while rotating the ingot about its longitudinal axis.

2. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom through its sides while rotating the ingot about its longitudinal axis.

3. The herein described method of treating metal ingots to prevent segregation and

the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom through the sides and smaller end of the same while rotating the ingot about its longitudinal axis.

4. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same to a uniform diameter and force the gases therefrom through the smaller end of the same.

5. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot circular in cross-section, and then applying pressure to the side of the ingot to reduce the same and force the gases therefrom and while the ingot is being subjected to a spinning movement about its longitudinal axis.

6. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom through its sides and while the ingot is being subjected to a spinning movement.

7. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom through the sides and smaller end of the same and while the ingot is being subjected to a spinning movement.

8. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure

to the side of such ingot to reduce the same to a uniform diameter and force the gases therefrom through the smaller end of the same and while the ingot is being subjected to a spinning movement.

9. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot circular in cross-section, and then applying pressure to the side of the ingot to reduce the same and force the gases therefrom and while the ingot is being subjected to a spinning movement about its longitudinal axis, by a rolling operation.

10. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom through its sides and while the ingot is being subjected to a spinning movement by a rolling operation.

11. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same and force the gases therefrom through the sides and smaller end of the same and while the ingot is being subjected to a spinning movement by a rolling operation.

12. The herein described method of treating metal ingots to prevent segregation and the injurious action of the pipe formed therein, which comprises the steps of forming the ingot into conical shape and circular in cross-section, and then applying pressure to the side of such ingot to reduce the same to a uniform diameter and force the gases therefrom through the smaller end of the same and while the ingot is being subjected to a spinning movement by a rolling operation.

In testimony whereof, I, the said JAMES C. RUSSELL, have hereunto set my hand.

JAMES C. RUSSELL.

Witnesses:

T. B. HUMPHRIES,
J. N. COOKE.