UNITED STATES PATENT OFFICE.

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METHOD OF MAKING WROUGHT-IRON.

1,370,507. Specification of Letters Patent. Patented Mar. 8, 1921.

No Drawing. Application filed February 4, 1920. Serial No. 356,310.

To all whom it may concern:

Be it known that I, JAMES ASTON, residing at Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Methods of Making Wrought-Iron, of which the following is a full, clear, and exact description.

Heretofore in the making of wrought iron by either the hand puddling or the mechanical puddling processes, it has been necessary to roll the balls or blooms into bars, shear these bars, pile them and re-roll them after heating to a welding temperature. This operation, which is expensive and causes a considerable loss of metal, is often repeated to give the desired product.

The reason for this cutting, piling and re-rolling is that the slag distribution in the usual puddle ball or bloom is coarse and the refining incomplete. By piling the bars, re-heating and rolling one or more times, there is a secondary refining action, an averaging or blending of the different qualities of bars produced by individual puddlers, and a finer distribution of the slag filaments.

I have discovered that by granulating or comminuting the product of a steel-making process and mixing the granulated product with a proper puddling slag and welding to form a ball or bloom of large size, I can obtain a good product, without the preliminary rolling into bars, re-piling, re-heating and re-rolling.

In carrying out my improved process, I preferably employ the general method set forth in my copending application Serial No. 279,950, filed March 1, 1919, wherein the molten substantially slagless product of a steel-making process is granulated while dropping through the air and is received in a receptacle containing a bath of molten slag of the proper consistency and temperature, so that a ball of mixed slag and metal will be formed below the surface of the slag in the receptacle.

In carrying out this process according to my present invention, I make a very large ball or mass. The ordinary puddle ball or bloom weighs about two hundred pounds, while in my improved process, I preferably make a ball of one ton and upward in weight. After the ball has been formed, the excess slag is poured off or removed and the hot ball taken to a squeezer which is preferably in the form of a squeezing press, where it is pressed into a large bloom. This bloom is then rolled into a slab or billet with or without heating or preserving its heat in a storage furnace preliminary to rolling. Preferably, the operations up to this point are carried out at one heat, though the surplus may be stored in a storage furnace.

After rolling the bloom into a slab or billet, the slab or billet is preferably fed into a continuous heating furnace, and thence taken to a mill, such as a skelp mill, where it is rolled into skelp or the desired product. The slabs or billets may be charged into the continuous furnace, either hot or cold, and the surplus slabs or billets from the first rolling mill may be stored in a soaking pit furnace to give a uniform supply to the skelp or finishing mill according to its requirements.

If the material is to be rolled into wire or other material, the mill succeeding the continuous furnace will, of course, be a different type, depending on the finished product desired.

It will be noted that in this operation there is no cutting, piling and reheating or rolling of the piles, as in ordinary puddling practice. I can thus do away with the large amount of expense and labor owing to the use of the large balls or masses which can be easily formed in accordance with my general process. Owing to the granulating of the steel furnace product, the distribution of slag will be substantially uniform, and sufficient work will be put on the ball or bloom to give the desired fineness, etc., in the product. Storage furnaces may be used between any of my steps in order to keep a supply for the succeeding operation and take care of any surplus. Preferably, the operation is carried out at one heat, through the slab or billet mill.

The advantages of my invention will be obvious to those skilled in the puddling art, since several expensive and laborious operations are done away with and a good wrought iron product obtained. Different types of apparatus may be used for squeez-

ing or pressing the large ball or mass and other changes may be made without departing from my invention.

I claim:

1. In the method of producing wrought iron, the steps consisting of forming a large wrought iron ball or mass from the substantially slagless product of a steel-making process, squeezing the same, and rolling it directly into slab or billet form.

2. In the method of producing wrought iron, the steps consisting of forming a large wrought iron ball or mass from the substantially slagless product of a steel-making process, squeezing the same, rolling it directly into slab or billet form, and then rolling the slab or billet into the desired product.

3. In the method of producing wrought iron, the steps consisting in granulating the substantially slagless product of a steel-making process, forming a large welded ball of this granulated product and a proper slag, squeezing the large ball, rolling it directly into the slab or billet, and then reheating and rolling the slab or billet into the desired product.

4. In the method of producing wrought iron, the steps consisting of forming a puddle ball of such a size as not to require repiling, removing it and rolling the same direct into the desired product.

5. In the method of producing wrought iron skelp, the steps consisting of forming a large wrought iron ball, squeezing it, rolling it directly into a slab or billet, and then rolling the same directly into skelp.

6. In the method of producing wrought iron skelp, the steps consisting of forming a large wrought iron ball, squeezing it, rolling it directly into a slab or billet, reheating, and then rolling into skelp.

In testimony whereof I have hereunto set my hand.

JAMES ASTON.