F. F. WAECHTER.

PROCESS OF MAKING PUDDLE BALLS AND FURNACE THEREFOR.

APPLICATION FILED FEB. 6, 1919.

1,340,690. Patented May 18, 1920.

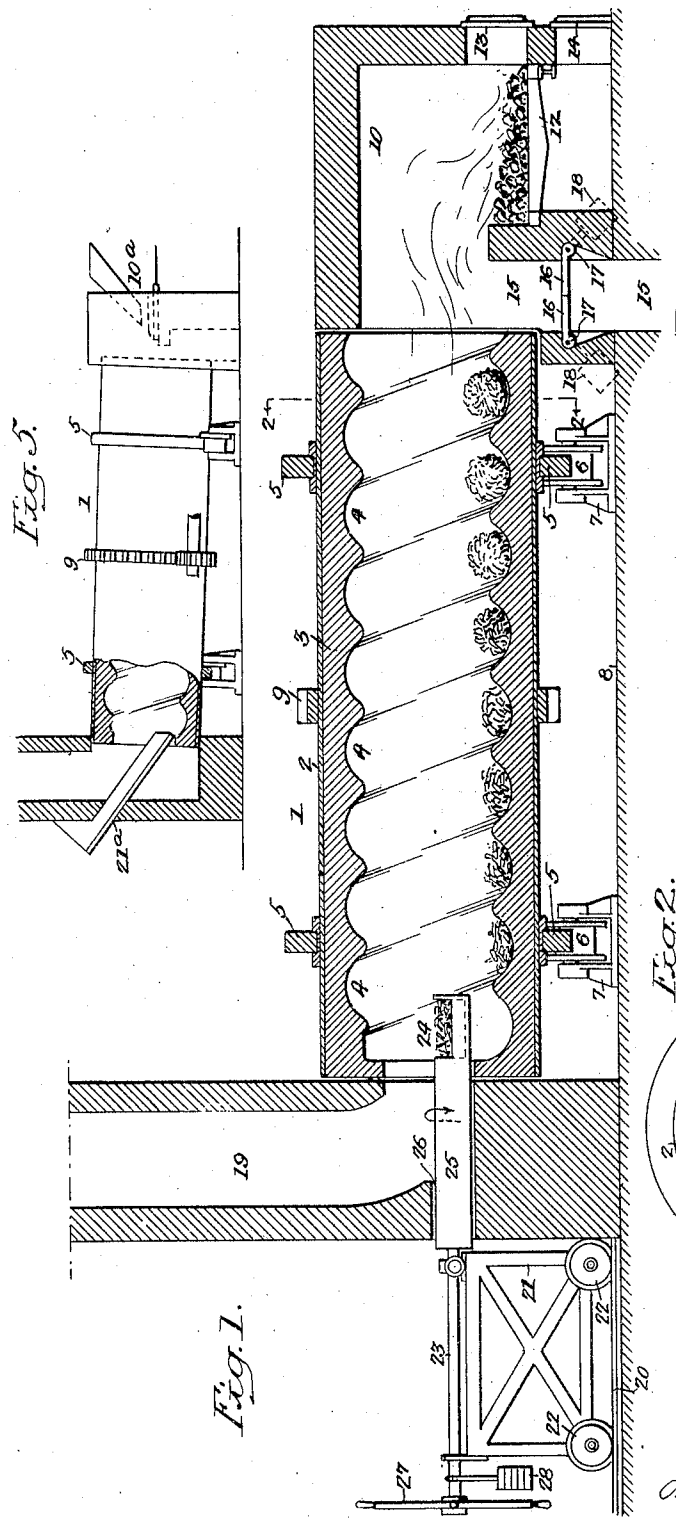


Fig. 1.

Fig. 5.

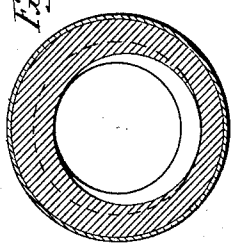


Fig. 4.

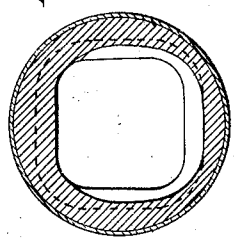


Fig. 3.

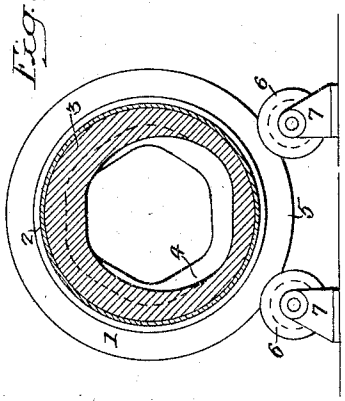


Fig. 2.

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UNITED STATES PATENT OFFICE.

FERDINAND F. WAECHTER, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF MAKING PUDDLE-BALLS AND FURNACE THEREFOR.

1,340,690. Specification of Letters Patent. Patented May 18, 1920.

Application filed February 6, 1919. Serial No. 275,376.

To all whom it may concern:

Be it known that I, FERDINAND F. WAECHTER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Processes of Making Puddle-Balls and Furnaces Therefor, of which the following is a specification.

My invention relates to certain improvements in the method and apparatus for making puddle balls, particularly of scrap material. These puddle balls, after being formed in the furnace, are compacted by being passed between squeeze rolls and other forms of pressing means, after which they are passed to reducing rolls and the ordinary process is carried out.

Heretofore, the usual practice has been to make a puddle ball either by hand or in a rotary furnace, one ball being made at a time. The furnace had to be opened and the ball discharged before another ball was formed.

The main object of my invention is to make the puddle balls by a continuous process so that one charge of scrap after another can be placed in the furnace and, as the furnace rotates, the material will be progressively fed through the furnace and formed into balls so that they are discharged at the opposite end of the furnace in condition to be passed between the squeeze rolls, or other apparatus.

A further object of the invention is to provide means whereby the balls, during their formation, can be retained for a greater or less period in the furnace.

A still further object of the invention is to construct the furnace so that the balls will be fed forward progressively during their formation, and to provide a furnace which will properly heat the material and also to provide means for charging the furnace with material.

In the accompanying drawing:—

Figure 1, is a longitudinal sectional view through my improved furnace, illustrating the process of forming puddle balls from scrap material;

Fig. 2, is a sectional view on the line 2—2, Fig. 1;

Figs. 3 and 4, are views illustrating modifications of the form of the interior of the furnace; and

Fig. 5, is a view illustrating a modification in the construction of the furnace.

Referring to the drawing, 1 is a cylindrical furnace having a casing 2 and a lining 3 of suitable material. The interior wall of this furnace has a spiral groove 4 therein, the groove being of sufficient depth to retain each charge in its place while being formed into a ball. This cylindrical furnace has two rings 5 secured thereto, which are supported on grooved rollers 6 mounted in bearings 7 located on the floor 8. In the present instance, the furnace is rotated by a pinion engaging an annular rack 9 secured to the casing of the furnace, and this pinion may be driven by any suitable mechanism so that the furnace can be constantly or intermittently rotated, or given a series of short revolutions for the purpose described hereinafter.

10 is the fire box of the furnace having a bridge wall 11, a grate 12, fire doors 13 and ash doors 14. In the present instance the bridge wall is a sufficient distance from the end of the rotating section 1 of the furnace to allow the finished ball to drop into a passage 15, which is provided with shutters 16, of any suitable construction. The ball after it passes through this passage is directed into a squeezing apparatus of any suitable form.

The shutters 16, in the present instance, are pivoted at 17 and have counterbalance weights 18, so that when the ball is discharged from the rotating portion of the furnace it drops onto the shutters, which open automatically and close as soon as the ball passes. This prevents extra drafts from entering the furnace and cooling the products of combustion. Means, other than shutters, may be provided for controlling the currents of air without departing from the essential features of the invention.

At the opposite end of the cylindrical section of the furnace is a stack 19, which communicates with the rotary furnace and carries off the products of combustion. In the present instance, I have shown a charging apparatus for charging the furnace with a given amount of scrap material. On a track 20 at the rear end of the furnace back of the stack is a carriage 21 having wheels 22 adapted to the track 20 and on this carriage is a shaft 23 having a charging box 24 at its extreme end, the portion 25 of the box being shaped to fit the passage 26 at the base of the stack. The shaft can be turned in its

bearings by a hand wheel 27. I preferably provide a counterweight 28, which is so arranged as to turn the shaft when the carriage is moved toward the furnace so as to discharge the load more readily into the first convolution of the helix. The length of the charging device is so proportioned that the carriage can be moved up to a stop and, when the shaft is turned, it will properly discharge its load. While I have shown one form of charging device, other forms may be used without departing from the spirit of the invention.

I preferably make the interior of the chamber of the furnace hexagonal in cross section, as illustrated in Fig. 2, so that, when the ball is being formed, on the rotation of the furnace the ball will have a tendency to drop and crush the heated materials so as to more readily form the mass into a ball. It will be understood that, in some instances, the interior of the furnace may be rectangular, as in Fig. 3, or perfectly cylindrical, as in Fig. 4. In fact, the passage through the furnace may be of any shape to make the ball compact and as nearly round as possible.

In Fig. 1, I have shown the cylindrical section of the furnace arranged in a horizontal plane and the ball, as it is formed, is fed forward, due to the helical formation of the interior of this section.

In Fig. 5, I have shown the cylindrical section arranged at an incline so that the ball, as it is formed, assumes its rounded shape, not only by the helical formation of the interior walls of the furnace, but also by gravity. In this modification I have shown a powdered fuel burner 10^a instead of the fire chamber of Fig. 1. In place of the charging device, I have shown an inclined chute 21^a over which the charge of scrap material is passed to the rotating section of the furnace.

The operation of the furnace is as follows:—After the furnace is heated to the proper degree, the cylindrical portion is rotated at a predetermined speed, then the charge is placed in the box 24 of the charging apparatus and the charging apparatus is moved forward and its shaft 23 turned so as to discharge the contents of the box into the first convolution of the helix. Then, as the furnace slowly rotates, the scrap material becomes heated and, when it is heated to such an extent that the particles become sticky, the ball commences to be formed, due to the rotation of the furnace. When the material reaches the end of the furnace the particles will be substantially round in form. Each ball is discharged through the passage 15 and is directed to any suitable squeezing apparatus for condensing the ball so that it will be in proper condition to be passed through the rolls.

If it is found that the material is not "balling" properly and should be retained for a longer period in the furnace, the furnace may be rotated more slowly, or it may be rotated first in one direction and then in another, which permits the balls to roll without being fed forward, and when they are in proper condition the rotating movement is continued and the balls are discharged. While the furnace is being rotated first in one direction and then in another, the charging may be temporarily discontinued.

I claim:—

1. The process herein described of making puddle balls from scrap material, said process consisting, essentially, in supplying a furnace with a series of charges of scrap material and simultaneously progressively feeding the series of charges through the furnace while being subjected to a temperature sufficient to cause the particles to become sticky and to form into balls, and successively discharging the balls of said series.

2. The process herein described of making puddle balls, said process consisting, essentially, in charging a furnace with a series of masses of scrap material, simultaneously progressively advancing the scrap through the furnace in separated masses into a zone of welding temperature to cause the particles to adhere and form balls, and successively discharging the balls of said series.

3. The process herein described of making puddle balls from scrap material, said process consisting in feeding a predetermined amount of loose scrap material at intervals into a furnace and simultaneously progressively feeding a series of separated charges of said material through the furnace while the material of the several charges is given a rolling action so that the particles of scrap of each charge will first become sticky and will adhere to each other, the several charges being eventually successively formed in a round homogeneous mass.

4. The combination in a balling furnace, of a cylindrical section having the interior walls thereof in the form of a helix of substantially uniform height; means for rotating said cylindrical section in the same direction that the balls are advanced; means for feeding independent charges of scrap material into one end of the furnace, and a fire chamber at the opposite end of the furnace and toward which a series of said charges is progressively advanced and the charges successively formed into balls, said furnace having an opening to allow for the discharge of successive balled material.

5. The combination in a balling furnace, of an elongated cylindrical section; means for supporting the section; means for rotating the same; means for supplying heat to one end of the furnace; and a flue at the opposite end thereof, the interior walls of

the rotating section being in the form of a helix and the interior of the furnace in cross section being other than cylindrical so as to give the material, as it is being balled, a jarring effect while being progressively fed forward.

6. The combination in a balling furnace, of a rotating, elongated cylindrical section; means for rotating the same; means for supplying the section with heat, the interior wall of said section being in the form of a helix, the convolutions of which are well defined, the interior wall of the furnace in cross section being composed of a series of surfaces, one surface being arranged at an angle to another so as to give a jarring or pounding effect to the material while being formed in a ball as it is fed progressively through the furnace.

In witness whereof I affix my signature.

FERDINAND F. WAECHTER.