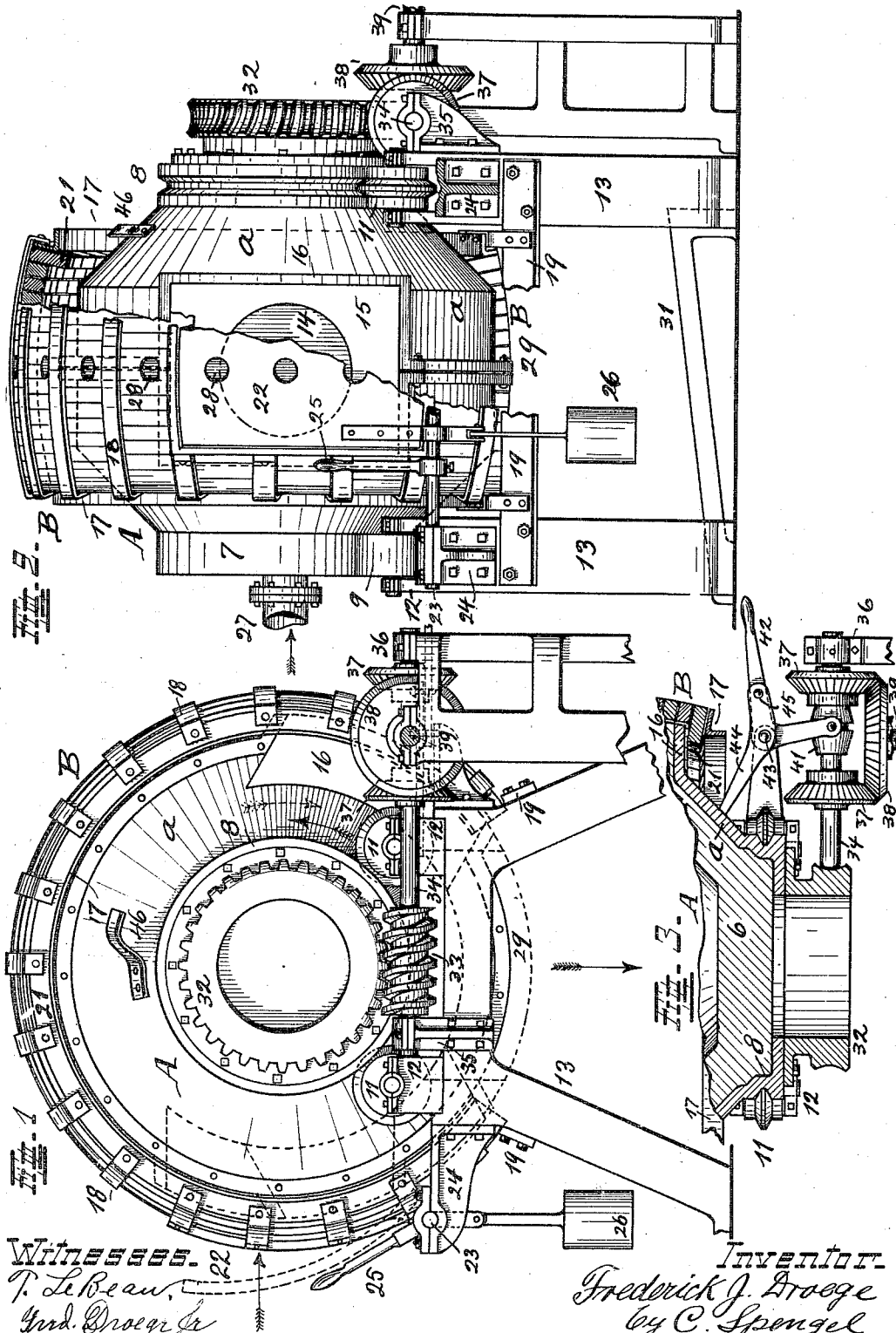


F. J. DROEGE.
 BUSHELING FURNACE.
 APPLICATION FILED JAN. 30, 1911.

995,230.

Patented June 13, 1911.



Witnesses.
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BUSHELING-FURNACE.

995,230.

Specification of Letters Patent. Patented June 13, 1911.

Application filed January 30, 1911. Serial No. 605,462.

To all whom it may concern:

Be it known that I, FREDERICK J. DROEGE, a citizen of the United States, and residing at Covington, Kenton county, State of Kentucky, have invented a certain new and useful Busheling - Furnace; and I do declare the following to be a clear, full, and exact description of the invention, attention being called to the drawing which accompanies this application and forms a part thereof.

This invention concerns the construction of busheling furnaces, a type of metallurgical furnace used in the manufacture of wrought-iron out of iron and steel scrap.

In the usual manufacture of wrought-iron out of scrap, a pile of this latter is heated in a furnace to a pasty consistency and worked by hand-manipulated tools into a lump or ball of convenient size suitable for further manipulation by rolls to be formed into blooms, billets and muck-bars from which finally the finished iron is produced. The purpose of this manipulation in the furnace is to effect certain necessary chemical changes and to clear the mass of slag, dross and foreign substances and impurities.

My invention consists of a certain construction whereby hand-manipulation is done away with, the required effect being obtained by moving the furnace in a certain manner to produce the same results.

In the following specification and particularly pointed out in the claims at the end thereof, will be found a full description of my invention, together with its operation, parts and construction, which latter is also illustrated in the accompanying drawing, in which:—

Figure 1, is a side-view of such a furnace with parts broken away. Fig. 2, is a front-view of the same with parts broken away. Fig. 3, is a combined top-view of certain parts and a longitudinal section of others, as they appear in Fig. 1, from which figure they are projected down, appearing immediately below the same.

A is the furnace proper, it being substantially of drum-shape with axially aligned trunnions which project outwardly from opposite sides and on which it is supported for rotation. Its shape, construction and manner of support is analogous to that of a furnace shown and described in my Patent No. 960,517.

An iron-shell *a*, preferably of two con-

nected sections is used and lined with fire-resisting material 6.

The trunnions are formed by circular extensions 7 and 8 of the shell and rest on rollers 9 and 11, carried in suitable bearings 12 on standards 13. One of these trunnions is grooved and the rollers operating in conjunction with it are correspondingly shaped to prevent lateral displacement of the drum.

One difficulty heretofore experienced in connection with rotary furnaces has been inability to hold heat sufficient for the purpose and which was largely due to the number of openings provided in walls of the drum, there being inlet and outlet openings for the charge and outlet openings for slag and dross. This I overcome by having only one opening 14 which serves for all purposes. An outwardly extending neck is provided in connection with this opening, the outside 15 of which is concentric with the circumference of the drum and two sides 16, 16, of which are parallel to the sides of the drum. Instead of a door serving as a closure for this opening I provide a hood B, preferably formed of fire-brick supported on two circular arches 17 held together by braces 18 and supported on standards 13 or on bars 19 connected to them.

The motion of the drum necessary to manipulate the charge into proper condition is a rotary-reciprocary one and alternates from the position where the neck is now shown on the right side of Fig. 1, to the one shown in dotted lines on the left side.

Hood B extends accordingly so that opening 14 is always covered by it and at its edges it is extended inwardly to form two flanges 21 into the space between which the neck projects. Its parallel sides 16—16 fit closely against these flanges so that the neck, during the motion of the drum moves in this space back and forth between these flanges. They prevent lateral draft and loss of heat.

A gap or opening is provided in the hood to afford communication with opening 14 and a door 22 for it, hinged by means of a rod 23 supported in bearings 24. 25 is a lever to manipulate this door. It is kept closed by a balance weight 26.

Blast-heat is used and introduced through one of the trunnions a suitable fuel, preferably oil or gas being used. A burner 27 constructed accordingly is provided for the pur-

pose. The pressure created by this blast is relieved by openings 28 in the hood which provide also an outlet for rust and impurities separated from the charge by the blast.

5 For the purpose of charging the furnace this latter is stopped with its opening 14 opposite door 22 in the hood, as shown in dotted lines. For the purpose of removing the charge, the furnace is caused to rotate
10 beyond the normal terminals of its reciprocatory motion and caused to stop between them, which position is also shown in dotted lines. A gap 29 is provided in the hood thereat to clear the exit. The ball formed
15 inside may drop upon an inclined grating 31 from which it is readily removed.

Slag and dross may discharge at the same time through the same opening and pass between the grating. A water-trough may be
20 provided below the grating to receive this matter.

The motion of the drum is a comparatively slow one and is obtained by means of a worm-wheel 32, driven by a worm 33.
25 The former is mounted on one of the trunnions and shaft 34 of the worm rotates in bearings 35 and 36 suitably supported.

The rotation of the worm-shaft as far as the reciprocatory motion of the drum is concerned is preferably controlled automatically for which purpose it is alternately driven by either one of two gear-wheels 37. They are rotated in opposite direction by a gear-wheel 38, mounted on a power-driven shaft 39.
35 They are loosely mounted on their shaft 34, but operatively connected to either one of gears 37 by a suitable clutch-device, the engagement being preferably frictional. 41 is the cone of this clutch mounted on shaft 34,
40 so as to rotate with the same, but free for longitudinal adjustment to engage either one or the other one of gear-wheels 37.

42 is a lever mounted at 43 and in engagement with clutch cone 41. It is used to control the clutch positively by hand when the drum is to be moved into position for charging or dumping and is to be stopped in either of these positions. Otherwise when the drum moves for agitating the charge the
50 clutch-cone is adjusted automatically by the drum for the purpose of alternately reversing the direction of its motion. For such purpose an additional lever-arm 44 is provided and also pivoted at 43. It is held to
55 the clutch-shifting lever 42 by a pin 45. Its other free end is alternately acted upon by two shifting-dogs 46, one only being now visible, the other one, as the parts are shown, having just contacted with said free end of
60 arm 44 and shifted the clutch to reverse the motion of the drum to cause its neck to move toward the other (left) side, as shown by the arrow. In due time the dog now visible comes in contact with arm 44 and shifts the
65 clutch again to the other side.

When it is desirable to control the clutch direct as for instance when the drum is to be moved and stopped for charging or dumping, pin 45 is removed so as to disconnect arm 44 from clutch-operating lever 42, which
70 latter is now used to manipulate the clutch by hand. Any contact at this time of one of the dogs 46 with arm 44 is without effect upon the clutch. This part of the construction may be varied to suit special conditions.
75

The charge is rolled on a bed of cinders some of which by being taken up serve as a flux and increase the ductility of the iron.

The charge while forming becomes visible whenever opening 14 in the drum passes
80 behind openings 28 in the hood and therefore its condition is under constant observation.

Having described my invention, I claim as new:

1. In a busheling furnace, the combination of a rotary drum with an opening in its annular side and a hood which surrounds this drum and serves as a closure for the opening therein and has an opening which
90 affords communication with the interior of the drum through the opening in the same when rotation of the drum is stopped with this opening opposite the opening in the hood.
95

2. In a busheling furnace, the combination of a rotary drum provided with an outwardly projecting neck which has an opening communicating with the interior of the drum and a hood arranged around this drum
100 so as to serve as a closure for the opening mentioned and has inwardly projecting flanges on its opposite lateral edges between which the neck of the drum extends and moves when the drum moves.
105

3. In a busheling furnace, the combination of a circular hood having a gap, a drum supported for rotation within this hood and having an opening, mechanism to rotate this drum and means to control this rotation and
110 to permit stoppage of the drum with its opening opposite the gap in the hood, said latter serving as a closure for the opening mentioned during rotation of the drum.

4. In a busheling furnace, the combination of a drum having trunnions on opposite sides on which it is supported for rotation and one of which has an opening, an opening in the peripheral side of the drum to permit the charge to pass, a hood which surrounds the drum and is provided with an opening, means permitting the drum to be stopped with its opening opposite the opening in the hood, a blast-heat burner communicating with the drum through the open
125 trunnion of the same and openings in the hood and opposite the peripheral side of the drum affording pressure relief when the opening in the drum passes opposite these openings in the hood.
130

5. In a busheling-furnace, the combination of a circular hood having a gap in its lowest part and an opening in its side above this gap, a door for this opening, a drum supported within this hood and provided with an opening in its peripheral side, means to operate this drum with a rotary reciprocating motion which is so limited that the opening in the drum does not traverse the gap in the hood and means to control this motion causing this opening to pass opposite the gap and to stop thereat, or opposite the opening in the hood.

6. In a busheling-furnace, the combination of a drum, supports for it, mechanism to rotate it, a clutch which controls this mechanism and means carried on the drum

to adjust the clutch to cause the mechanism mentioned to alternately reverse the rotation of the drum.

7. In a busheling-furnace, the combination of a drum, supports for it, driving mechanism adapted to rotate it in opposite directions, a clutch to control the driving mechanism, a hand-lever to manipulate the clutch and means operatively connected to the lever and adapted to be actuated by the drum to adjust this lever automatically.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

FREDERICK J. DROEGE.

Witnesses:

C. SPENGEL,

FRED. DROEGE, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
