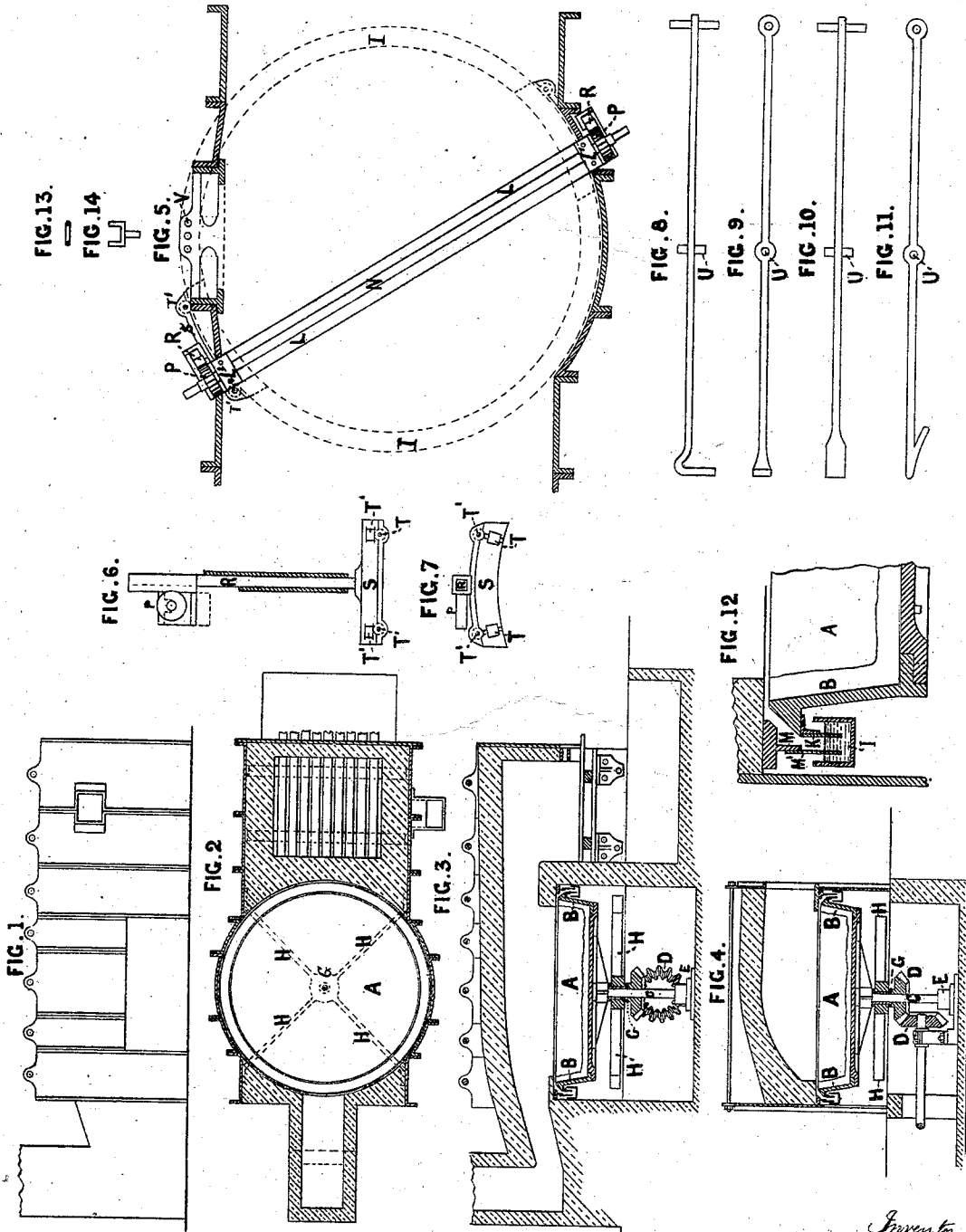


E. RILEY.
Puddling Furnaces.

No. 143,301.

Patented September 30, 1873.



Witnesses
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UNITED STATES PATENT OFFICE.

EZRA RILEY, OF PONTNEWYNYDD, ENGLAND.

IMPROVEMENT IN PUDDLING-FURNACES.

Specification forming part of Letters Patent No. **143,301**, dated September 30, 1873; application filed September 9, 1873.

To all whom it may concern:

Be it known that I, EZRA RILEY, of Pontnewynydd, in the county of Monmouth, England, have invented certain Improvements in Puddling-Furnaces, and in apparatus and appliances connected therewith, of which the following is a specification:

The object of this invention is to reduce the extreme manual labor now attending the production of wrought-iron in the puddling-furnace; at the same time to improve the quality of the iron so produced; to increase the yield or percentage; to increase the mass of iron worked upon at a time; and to reduce the time occupied in puddling; and, in order that the nature of this my invention may be fully ascertained, I will now proceed to describe the same with reference to the accompanying drawings, of which—

Figure 1 is a side elevation of the puddling-furnace; Fig. 2, a horizontal section; Fig. 3, a longitudinal section; Fig. 4, a vertical section; and the rest of the figures refer to details connected with the furnace and tools for working it.

Similar letters refer to like parts in all the figures.

The body or hearth of the furnace, which ordinarily contains the charge of materials to be treated, I make in the shape of a circular revolving pan, A, with the sides B, by preference, slanting, as shown. This pan or bottom A I cause to revolve by any well-known suitable mechanical means, and work it by steam or other power. I prefer, however, to mount the revolving pan A on a vertical shaft, C, which is caused to revolve by means of bevel-gear D D, and to support the vertical shaft C in a step, E, and in a collar or neck bearing, G, arranged in a cross-shaped bracket, the bearing being provided with and supported by four legs or arms, H H H H, which stay the lower part of the two opposite back and front outer furnace-plates together. The driving-gear for this revolving pan has two or more motions or speeds worked by friction-clutches, and may also, if desired, be worked from a separate steam-engine or other prime mover, the speed of which is under the direct control of the puddler or man in charge of the furnace. The pan A and parts connected therewith are

shown on a larger scale at Fig. 12. The pan A is, at the top, formed with a hanging lip, collar, or flange all around, either cast on or cast or forged of a separate piece and fastened on. This hanging lip or flange K dips into a circular trough or cistern, I, which is constantly kept supplied or filled sufficiently with water, thus forming a water-lute, and preventing the air from entering into the furnace or pan at any part of the circumference thereof, the outside of the pan, at the same time, being exposed to a full current of air, especially while the pan is revolving. If required, an artificial current of air may be applied. The fettling of the pan is preserved thereby. In order to prevent air from rushing into the pan from between the trough I and the surrounding brick-work, I fasten a flange, M, with a hanging lip, M', to the brick-work, all around the trough I, the hanging lip M' dipping into the said trough and forming a lute-joint there. The trough may be made to revolve in order to diffuse the heat better.

The upper edge of the pan A may be cast hollow to form a water-compartment all round, (or a water-pipe may be placed against it,) the water-compartment so formed being connected to a central tube with an internal tube, and having swivel tube-joints at the bottom of the vertical shaft, and so arranged as to cause a continual circulation of water.

The water-trough I may be made to rise and fall, and to turn by hand, in order to clear out any cinders or scoriæ that may fall into it when the pan is revolved rapidly. For this purpose the arrangements shown on a larger scale at Figs. 5, 6, and 7 may be applied, Fig. 5 being a horizontal section through the furnace-plates that bind the brick-work of the furnace together, the other parts of the furnace being left out for the sake of clearness. L is a girder or bracket going across outside over the top of the furnace, and has bearings L' for the shaft N, which carries a pinion, P, at each end. These pinions gear into racks R, which are guided up and down, as shown at Figs. 6 and 7, which are detail views, respectively in plan and elevation, of these parts. Each rack R is fastened onto a circular rim-piece, S, which, with its four rollers, T T T' T'', bears against the under side and against the outer side of

the trough I, thus carrying it at two opposite sides. The trough I is indicated by two dotted circles on Fig. 5. It simply rests on the lower rollers T T in the rim-pieces, and can thus easily be turned by hand. It is raised or lowered by turning the spindle N by means of a handle on one or both ends, the pinions P revolving, and thereby raising or lowering the racks which are fastened to the rim-pieces.

This puddling-furnace, with exception of the revolving pan or bottom A and the appliances described in connection therewith, is built up and stayed by bolts and plates like the ordinary puddling-furnaces, only that the plates at the back and front of the revolving bottom are cut short below, so as to admit the air freely. An ordinary puddling-furnace can thus easily be converted, fitted, and constructed according to this invention. I also employ the usual furnace-door with rabble-hole inserted, and that either at one side, as shown here on Fig. 5, or at both sides. The brick-work all round the top edge of the revolving pan projects, as shown, so as thereby to protect the pan and its fettling against the heat.

I employ several tools or appliances, which I will now describe in connection with the mode of working my puddling-furnace.

During the first stage of the process I use a tool somewhat similar to the ordinary rabble, but having a pin, which is caused to rest against some part of the inside of the rabble-hole in order to obtain a hold against the revolving mass of iron in the pan. This tool is shown in side view and plan, Figs. 8 and 9. U is the pin, which is put into one of the holes V, Fig. 5, in the rabble-hole. The iron is thus agitated rapidly while on the boil.

During the boiling of the iron a blast may be used, consisting of a thin, broad, flat cur-

rent of air, to be diffused across the surface of the iron, by preference in a slanting direction, toward the neck of the furnace, and from the side opposite to the rabble-hole. When the iron begins to "form" or "drop into nature" the speed is reduced as required; and the pud-dler then makes use of another tool, represented in plan and side view by Figs. 10 and 11. This tool may be called the plow, because it is formed somewhat in the form of a plow-share, and causes a complete turning over, breaking up, and clearing of the iron. When thus sufficiently worked the iron is balled in the usual manner, and that either from one side, as here, or from both sides, and in balls of any required size.

Fig. 13 is a plan, and Fig. 14 a side, view of a staple or guide, which may be used in connection with the tools, and which, when inserted in one of the holes V, serves as a fulcrum when working with one of the tools.

And, having thus fully described and ascertained the nature of this my invention, I declare that I claim—

1. A water-vessel and flanges passing into the water, in combination with a revolving puddling-bed, substantially as specified, so as to form a water-lute at the joint, as set forth.

2. In combination with the water-vessel, flanges, and revolving puddling-bed, the means, substantially as set forth, for raising or lowering the trough, for the purposes specified.

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