

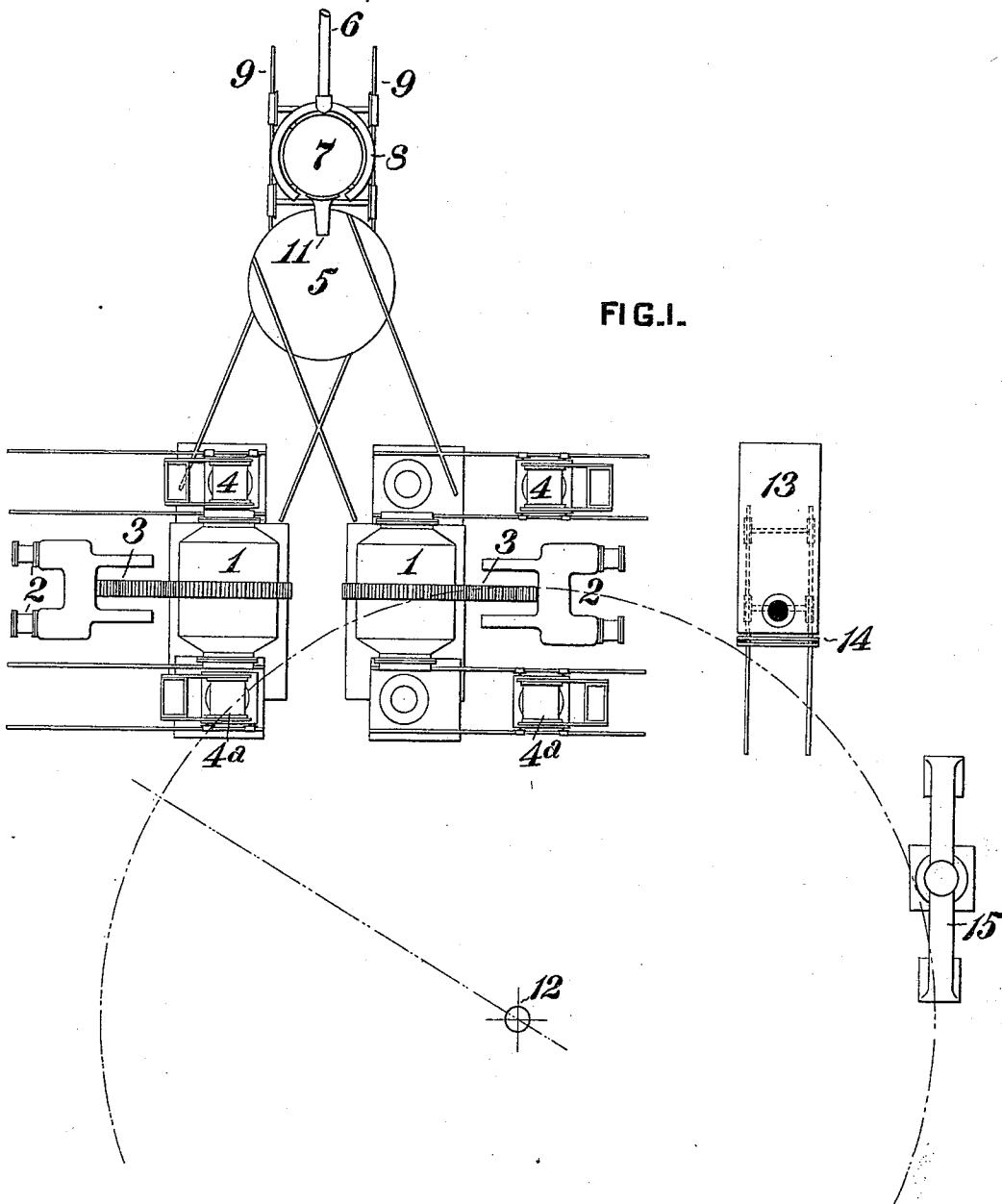
(No Model.)

3 Sheets—Sheet 1.

E. L. FORD.
METALLURGICAL PLANT.

No. 513,099.

Patented Jan. 23, 1894.



WITNESSES:

Daniel S. Wolcott
F. E. Gaither

INVENTOR,

Edward L. Ford
by *George H. Christy*
Att'y.

E. L. FORD.
METALLURGICAL PLANT.

No. 513,099.

Patented Jan. 23, 1894.

FIG. 2.

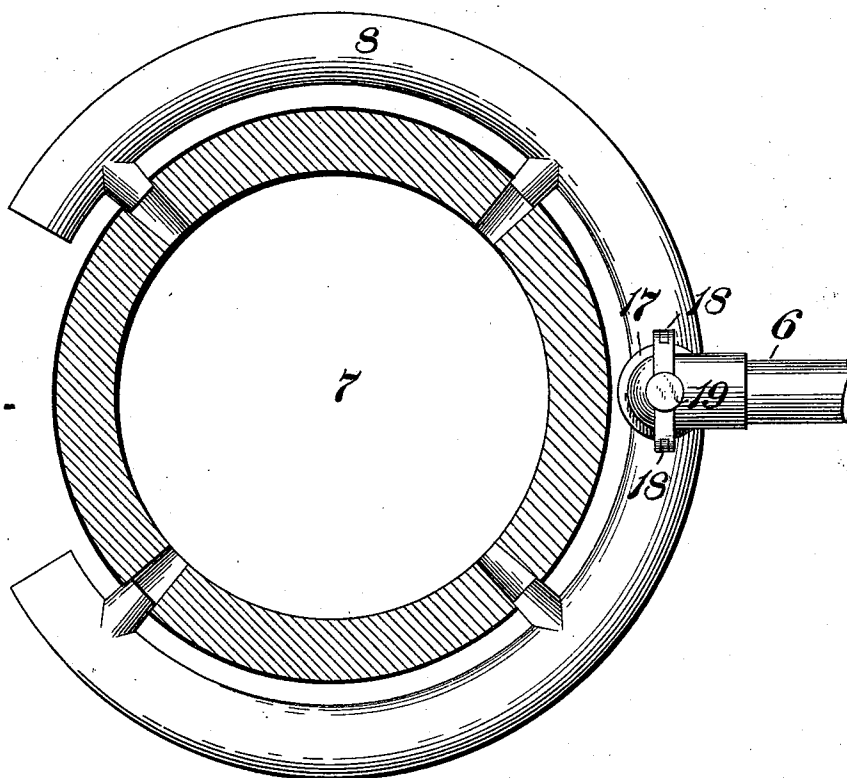
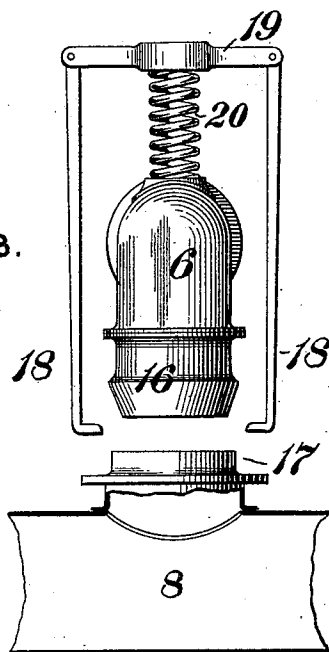


FIG. 3.



WITNESSES:

Darius S. Wolcott
J. C. Gaither

INVENTOR,

Edward L. Ford
by *George H. Christy* Att'y.

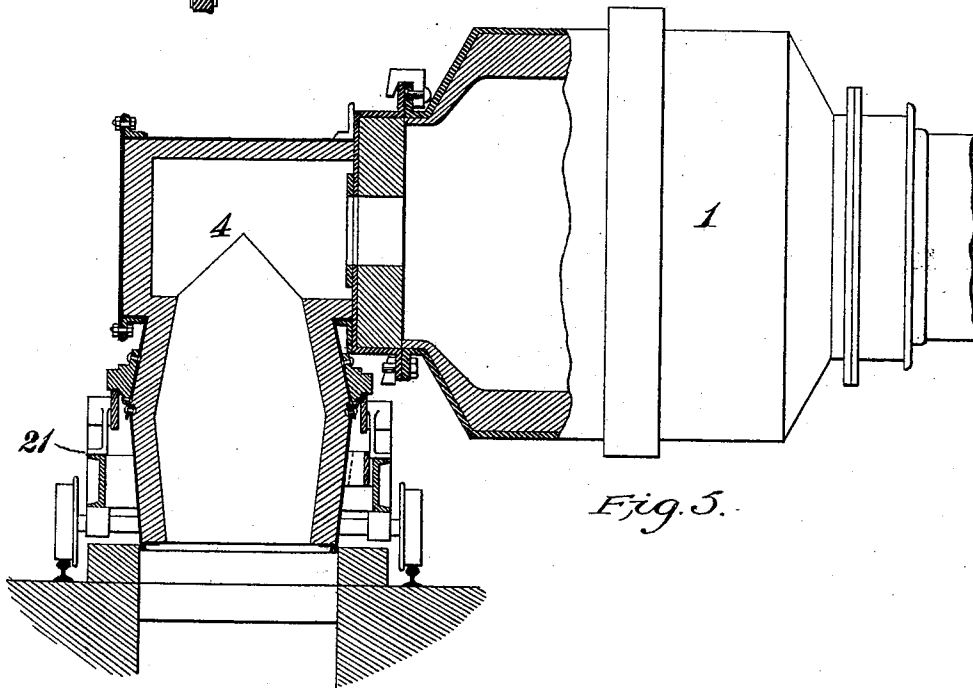
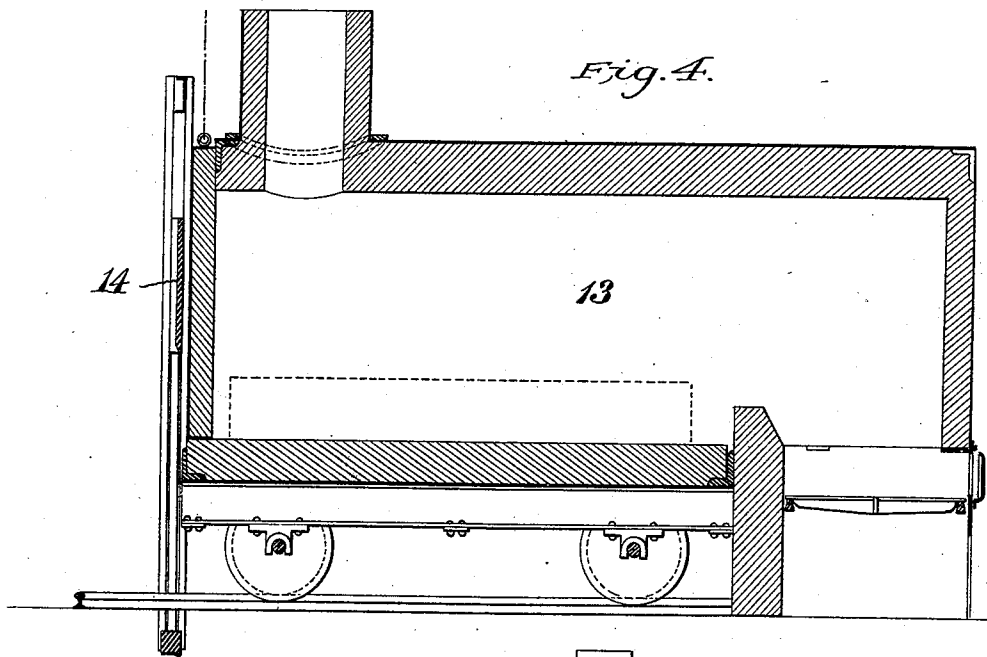
(No Model.)

3 Sheets—Sheet 3.

E. L. FORD.
METALLURGICAL PLANT.

No. 513,099.

Patented Jan. 23, 1894.



Witnesses.

Danwin S. Wolcott
J. E. Gaither

Inventor.

Edward L. Ford,
by George H. Christy
his Atty

UNITED STATES PATENT OFFICE.

EDWARD L. FORD, OF YOUNGSTOWN, OHIO.

METALLURGICAL PLANT.

SPECIFICATION forming part of Letters Patent No. 513,099, dated January 23, 1894.

Application filed February 1, 1893. Serial No. 460,596. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. FORD, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented or discovered certain new and useful Improvements in Metallurgical Plants, of which improvements the following is a specification.

The invention described herein relates to certain improvements in metallurgical plants, and has for its object the manufacture of billets from large blooms. Great difficulty is experienced in handling the products of rotary puddling furnaces, for the reason that the blooms produced therein generally weigh one thousand eight hundred pounds and upward, and it is very difficult to properly work such blooms under the hammer sufficiently to eliminate the scale and cinder before the metal has become so cool as to render the working practically impossible. Hence, it had been customary to divide the bloom, leaving one part in the puddling chamber while the other part is being worked under the hammer. This method is objectionable for the reason that the puddling chamber must remain idle, while at least one portion of a previously formed bloom is being worked.

In general terms, my invention consists in providing a movable cupola or melting furnace for charging the puddling chambers, and a re-heating or soaking furnace provided with a suitable shearing apparatus, for storage of the blooms while awaiting working under the hammer, and dividing the blooms into parts of any desired size, all as hereinafter more fully described and claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is a plan view showing the arrangement of my improved plant. Fig. 2 is a transverse sectional view through the cupolas on the line of the bustle pipe, showing the detachability of the blast pipe from the bustle pipe; Fig. 3, a detail view of the same parts. Figs. 4 and 5 are sectional elevations of the soaking furnace and the rotary puddling furnace respectively.

In the practice of my invention I provide one or two rotary puddling chambers 1, of the Danks or any other suitable type, with suitable engines as indicated at 2, with the gearing 3 for driving the puddlers. At the ends

these puddling chambers are provided with movable flue sections 4 for connecting the puddling chambers with flues leading to suitable regenerating chambers. These flue sections 4 are preferably mounted upon trucks 21 arranged on tracks passing along the ends of the puddling chambers as shown in Fig. 5, and more particularly described and shown in an application of even date herewith.

When employing two puddling chambers, two lines of rail extend from a common point, as the turn-table 5, to points closely adjacent to the ends of the puddling chambers into which the molten iron is to be charged. If desired, the turn-table 5 may be used as the blowing station, so to speak, for melting the iron in the cupola. In such case, the main blast pipe 6, is extended from any suitable blowing engine to the turn-table, and is detachably connected when the cupola 7 is to be blown, to the bustle pipe 8, as shown in Figs. 2 and 3; or, if preferred, the blowing station may be located at a distance from the turn-table, in which case a line of rails 9, is extended from the turn-table to the blowing station. The cupola 7 is mounted on a suitable truck adapted to run on the lines of rails described, and is provided with a nozzle 11, which will extend nearly into the openings in the ends of the puddling chambers, when the cupola is shifted into position in front of them.

After a charge of molten metal has been tapped into one of the puddling chambers, the cupola is shifted back to the blowing station, and a new charge of metal is melted therein. After the puddling chamber has been charged, the movable flue sections 4, 4^a, are shifted into position in front of the ends of the puddling chambers, as shown in the left hand puddling chamber in Fig. 1, thereby connecting the puddling chambers with the regenerating chambers. The puddling chambers are then rotated, and subjected to a reducing heat, in the customary manner. After the metal has become balled, the necks 4, 4^a, are drawn back from the end of the puddling chamber and the bloom is removed from the latter by suitable gripping mechanism carried by the crane indicated at 12, and transferred to the movable hearth of the re-heating and soaking furnace 13. This furnace as shown in Fig. 4, is provided with a movable

hearth 22 capable of being shifted along the line of rails at one end of the hearth entirely out of the latter, as fully described and shown in an application filed February 1, 1893, Serial No. 460,598, to which reference should be had for the construction and mode of using the furnace, and under the shearing mechanism, 14, located at one end of the same.

If, at the time of moving the bloom from the puddling furnace, the hammer or reducing mechanism 15 is not in use, a portion of the bloom is cut off by the shearing mechanism and transferred to the hammer by the crane, while the remaining portion of the bloom is placed inside of the furnace 13, by shifting the movable hearth into its normal position, and there kept in a heated condition until the portion transferred to the hammer has been properly worked.

The end of the main blast pipe 6, is provided with a downward extension 16, adapted to fit in a suitable collar 17, on the bustle pipe 8, and is held in such position by a suitable yoke, consisting of the pivoted arms 18, pivoted to the end of the cross head 19. The arms 18 are provided with inwardly projecting fingers adapted to engage the flange of the collar 17, and between the cross head and the main blast pipe is interposed a spring 20, so that the blast pipe will be yieldingly held in connection with the bustle pipe.

It will be observed that by employing a movable cupola adapted to traverse along rails leading to each of the rotary puddling chambers, I am able to dispense with the use of a ladle, and the chilling of the metal incident thereto, and that I am enabled to keep a charge of molten metal in readiness for either puddling chamber and avoid the delay incident to tapping the metal out of a metal furnace into a ladle, and then from the ladle into the puddling chamber. By the employment of a reheating or soaking furnace provided with a shearing mechanism, I am enabled to maintain the blooms in a heated condition, leaving the puddling furnaces free for the treat-

ment of another charge of metal, and to divide the bloom into parts of size suitable for working under the hammer or otherwise, while at the same time maintaining the remaining portion of the bloom at such a heat, or in such a condition as will permit of its being worked by the hammer at any time. In this arrangement of apparatus each part thereof may be worked continuously and to its full capacity, and not be delayed by reason of the over-charging of another part thereof, or by reason of another part thereof being idle through breakage or otherwise, for a short time.

I claim herein as my invention—

1. In a metallurgical plant the combination of one or more puddling furnaces and a movable melting furnace for charging the puddling furnaces, substantially as set forth.

2. In a metallurgical plant the combination of one or more puddling furnaces, a soaking furnace, a shearing mechanism a hammer, and means for transferring the bloom or portion thereof to the several devices in due succession substantially as set forth.

3. In a metallurgical plant, the combination of a puddler, a movable cupola or melting furnace, a heating or soaking furnace, a shearing mechanism, a hammer, and means for transferring the bloom or portion thereof to the several devices in due succession substantially as set forth.

4. In a metallurgical plant, the combination of a puddling furnace, a soaking or heating furnace provided with a hearth movable into and out of the furnace, a shearing mechanism arranged in the line of movement of the hearth, and a hammer, substantially as set forth.

In testimony whereof I have hereunto set my hand.

EDWARD L. FORD.

Witnesses:

W. R. MERRICK,
F. D. JONES.