

R. W. MCGARVEY.
 TWYER FOR BLAST FURNACES.
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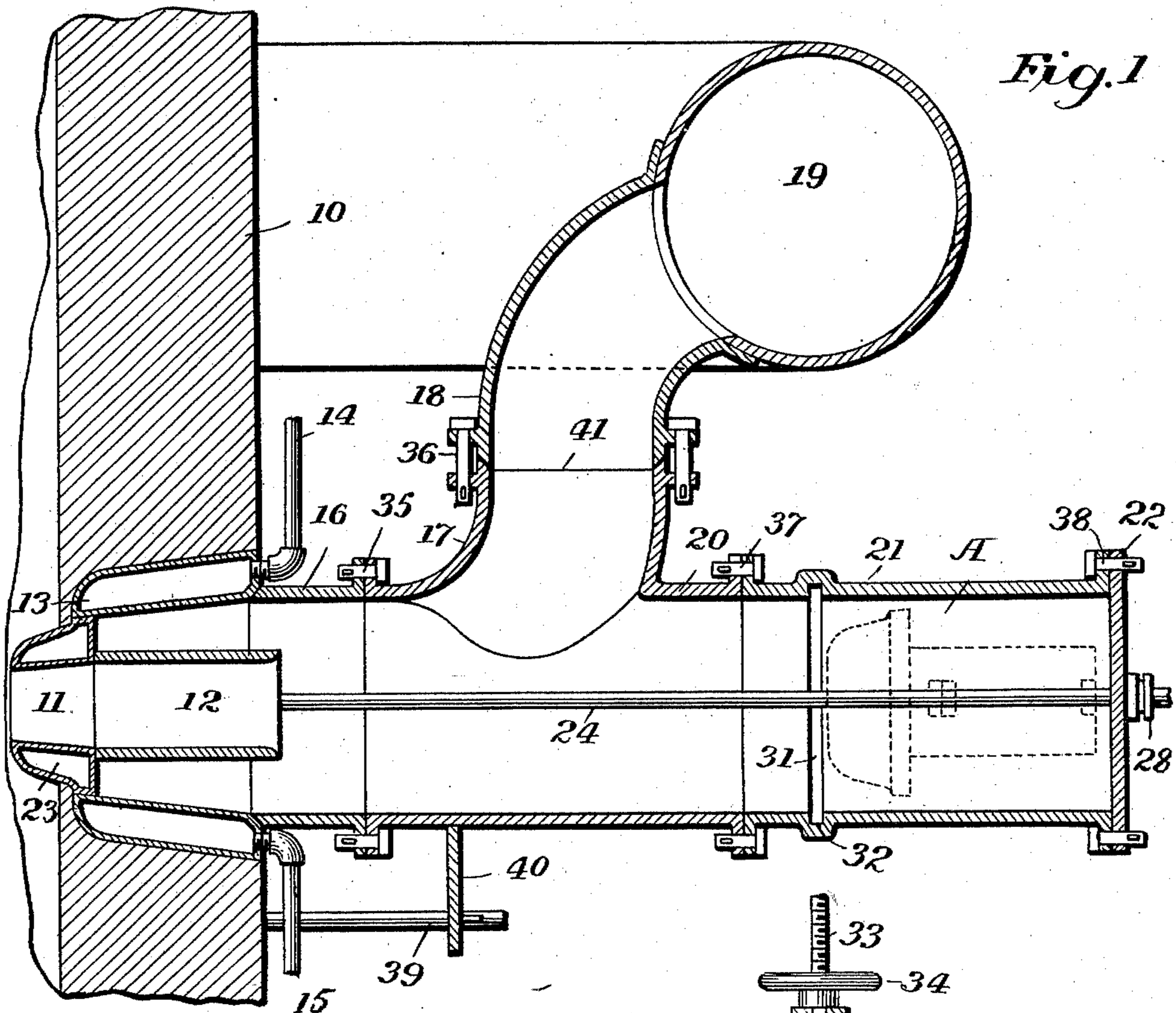


Fig. 1

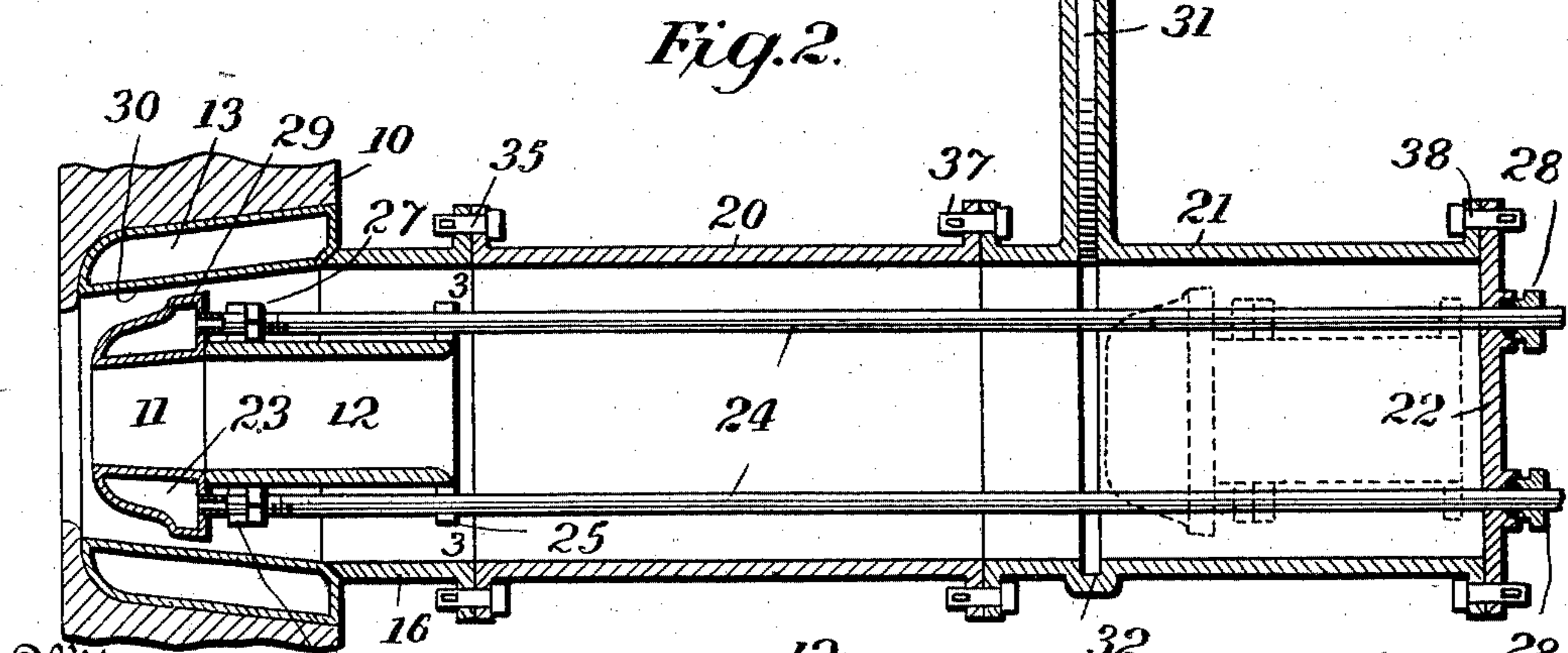
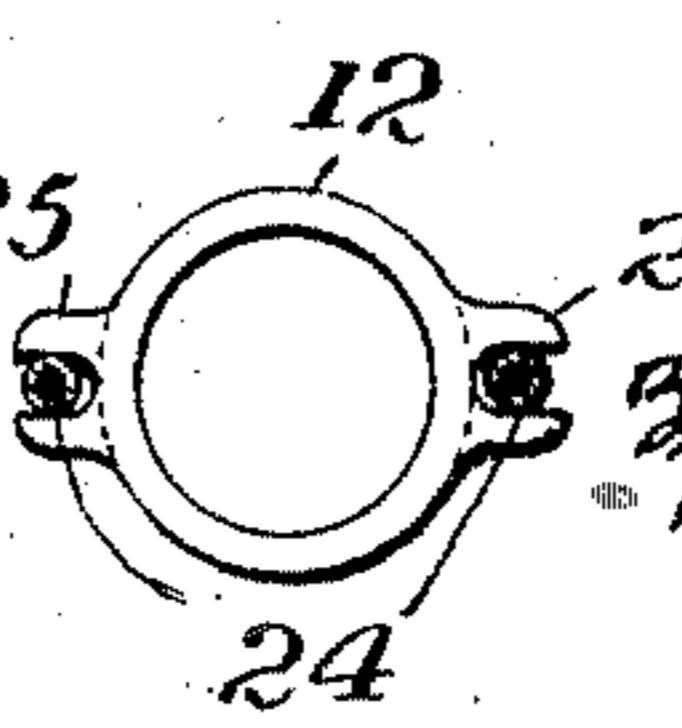


Fig. 2

Witnesses
J. G. Linkel
J. N. Brunninga

Fig. 3.  *Robert W. McGarvey*
 Inventor
Forster Freeman Watson & Co.
 Attorneys

UNITED STATES PATENT OFFICE.

ROBERT W. MCGARVEY, OF WOODLAWN, PENNSYLVANIA.

TWYER FOR BLAST-FURNACES.

967,416.

Specification of Letters Patent.

Patented Aug. 16, 1910.

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To all whom it may concern:

Be it known that I, ROBERT W. MCGARVEY, a citizen of the United States, and resident of Woodlawn, county of Beaver, State of Pennsylvania, have invented certain new and useful Improvements in Twyers for Blast-Furnaces, of which the following is a specification.

This invention relates to twyers for blast furnaces.

In the operation of blast furnaces it is often necessary to remove the twyers for repairs or inspection. In prior constructions this removal required a large amount of labor, necessitating the disassembling of a large part of the blast connections and the shutting down of the blast.

One of the objects of this invention, therefore, is to construct a twyer and mount it in such a manner that it may be easily and quickly removed from its seat for inspection, repair, or replacement, and the same or the replaced twyer quickly placed in position without requiring the tearing down of the blast connection or necessarily the interruption of the blast.

Further objects will appear from the detailed description.

The invention will be described in connection with the accompanying drawings in which—

Figure 1 is a vertical section through a part of a furnace, one of its twyers and the bustle pipe; Fig. 2 is a section through the twyer at right angles to the section in Fig. 1; Fig. 3 is a section on the line 3—3 Fig. 2, showing an end view of the guide pipe connected with the twyer.

Referring to the drawings, 10 designates the wall of a blast furnace and 11 one of the twyers mounted therein. The twyer has connected to it a guide section 12, and is mounted in a cooler 13 which forms a seat for the twyer, the cooler being provided with water connections 14, 15. A blast pipe composed of sections 16, 17 and 18 is connected to the bustle pipe 19. The blast pipe has a section 20 extending beyond the connection leading to the bustle pipe, and this section includes another section 21 attached thereto which forms a compartment A. Section 21 is closed by an end or cover plate 22.

The twyer is provided with a water jacket or cavity 23 and with water pipes 24 connected thereto in any suitable manner, preferably by cooperating threads. The water

pipes extend through U shaped lugs 25, 26 and the section 12 is rigidly connected to the twyer section by means of nuts 27 upon the pipes 24, bearing against the lugs 26. The water pipes 24 extend through and are guided by stuffing boxes 28 in the head or cover plate 22, the ends of the water pipes being connected to the water supply in any suitable manner, preferably by flexible connections for the purpose which will hereafter appear. The cooperating faces 29 and 30 of the twyer and the cooler are of tapered construction, so that when the twyer is out of operative position, as shown in full lines in Fig. 2, a free annular space is formed between the twyer and its seat. A gate valve 31 is slidingly mounted in the section 21 and cooperates with a seat 32. This valve is provided with a threaded stem 33, cooperating with a threaded hole in a hand-wheel 34, so that the valve may be opened and closed by means of the hand-wheel.

The blast pipe sections are detachably connected together by key-bolts 35, 36, 37 and 38, and the entire blast pipe is secured in position by means of a number of key-bolts 39, extending through lugs 40, secured to the section 17. The joint between the sections 17 and 18 is preferably a ball and socket joint 41 so that the assembling may be facilitated.

When the twyer is in operative position on its seat, as shown in full lines in Fig. 1, the blast from the bustle pipe 19 passes through the sections of the blast pipe and through section 12 and the twyer into the furnace. Whenever it is desired to remove the twyer for inspection or repairs, it is withdrawn from its seat by means of the water pipes 24, which form guide rods into the compartment A, as shown in dotted lines in Figs. 1 and 2. When the twyer is in this position the gate 31 may be closed on its seat 32 so as to cut off communication between the compartment A and the other section of the blast pipe. The twyer may then be removed entirely from the compartment by unbolting the end 22. The twyer may now be inspected or replaced and the inspected or replaced twyer placed in compartment A and the end 22 bolted in place by means of the key-bolts 38. The gate 31 may now be moved to open position, as shown in Fig. 2, and the twyer moved to operative position on its seat. It will be noted that during the removal or replace-

ment of the twyer the blast continues in operation and it is not necessary to cut it off. When the twyer is out of operative position, and when it is being moved on to its seat, as shown in Fig. 2, the blast enters the annular tree space formed between the twyer and its seat, due to the tapered construction. The blast is thus split up, part of the blast entering the twyer through the section 12 and part of it passing through the annular space formed between the twyer and its seat. In this way the stock in the furnace in front of the twyer, as well as around it, and in front of the twyer seat, is subjected to the blast so that the metal in the vicinity and all around the twyer and its seat is melted, allowing the twyer to be gently pressed in place without necessitating a violent pressure, which might cause breakage. When the twyer is withdrawn the metal cannot rush on to the seat or the cooler and thus adhere to it, since the blast passing through the free space around the twyer will prevent this.

The pipe sections 17 and 18 are made large enough so that the twyer may, if desired, be removed through these sections of the blast pipe. The twyer may be removed by unscrewing the water pipes 24 therefrom and then removing the twyer through the sections 16, 17 and 18 of the blast pipe in an obvious manner. The joints between the sections are provided with any suitable airtight packing. The provisions of the key-bolts permits the sections to be readily disconnected and assembled.

It is not necessary that the twyer 11 be provided with a water cavity, since a twyer of refractory material, as fire brick, may be used. In such a case the cooler 13 may also be dispensed with. Where such a twyer is used the water pipes become merely guide rods. When a refractory twyer is used it may be removed by inserting a rod through an aperture in the cover 22 for breaking the twyer, the broken fragments being pushed into the furnace and a new one replaced in the manner described. It is not essential that the twyers be placed below the bustle pipe, although that is the usual practice, but the bustle pipe may be placed in line with the twyers, so that it is between sections 16 and 21, the channel in both sections extending right through the bustle pipe. All of the above variations are within the scope of this invention. It is further obvious that various changes may be made in the details of construction without departing from this invention, and it is, therefore, to be understood that this invention is not to be limited to the specific construction shown and described.

What I claim as new and desire to secure by Letters Patent is:—

1. In a furnace, the combination with a

blast pipe, of a removable twyer constructed and arranged so that the blast from said blast pipe may pass therethrough and into the furnace, and means whereby said twyer may be removed or replaced through said blast pipe.

2. In a furnace, the combination with a blast pipe, of a removable twyer comprising a short tubular member arranged in said blast pipe and constructed so that the blast from said blast pipe may pass therethrough and into the furnace, and means whereby said twyer may be removed or replaced through said blast pipe.

3. In a furnace, the combination with a blast pipe having a part forming a compartment, of a removable twyer arranged in said blast pipe and constructed so that the blast from said blast pipe may pass therethrough and into the furnace, means whereby said twyer may be moved from operative position and into said compartment or vice versa, and means whereby said twyer may be removed from or replaced in said compartment.

4. In a furnace, the combination with a blast pipe, of a removable twyer arranged to receive the blast from said blast pipe, and means whereby said twyer may be removed or replaced through said blast pipe without interrupting the blast.

5. In a furnace, the combination with a blast pipe, of a removable twyer, a gate for a part of said blast pipe, means whereby said twyer may be moved from operative position to a position beyond said gate, or vice versa, and means whereby said gate may be opened and closed.

6. In a furnace, the combination with a removable twyer, of a blast pipe having an extension provided with a gate, means whereby said twyer may be moved from operative position to a position beyond said gate, or vice versa, and means whereby said gate may be opened and closed.

7. In a furnace, the combination with a removable twyer, of a blast pipe having an extension forming a compartment, means whereby said twyer may be moved from operative position into said compartment, or vice versa, and means for closing communication between said compartment and the other section of the blast pipe.

8. In a furnace, the combination with a removable twyer, of a blast pipe having an extension forming a compartment, means whereby said twyer may be moved from operative position into said compartment, or vice versa, and a gate valve arranged to close communication between said compartment and the other section of said blast pipe.

9. In a furnace, the combination with a removable twyer, of a bustle pipe, a blast pipe connected thereto, a gate for the blast pipe located beyond its connection to the

bustle pipe, means whereby said twyer may be moved from operative position to a position beyond said gate, or vice versa, and means whereby said gate may be opened and closed.

10. In a furnace, the combination with a removable twyer, of a bustle pipe, a blast pipe connected thereto and having a part extending beyond its connection with said bustle pipe, a gate for said extension, and means whereby said twyer may be removed or replaced through said extension.

11. In a furnace, the combination with a removable twyer, of a bustle pipe, a blast pipe connected thereto and having a part extending beyond its connection with said bustle pipe and forming a compartment, means whereby said twyer may be moved from operative position into said compartment, or vice versa, and a gate valve in said extension for closing communication between said compartment and the other section of the blast pipe.

12. In a furnace, the combination with a removable twyer, of a blast pipe having an extension forming a compartment, means whereby said twyer may be moved from operative position into said compartment, or vice versa, means for closing communication between said compartment and the other section of the blast pipe, and means whereby said twyer may be removed from or replaced in said compartment.

13. In a furnace, the combination with a removable twyer, of a blast pipe having an extension forming a compartment, means whereby said twyer may be moved from operative position into said compartment, or vice versa, means for closing communication between said compartment and the other section of the blast pipe, and a removable end for said compartment whereby said twyer may be removed therefrom or replaced therein.

14. In a furnace, the combination with a removable twyer, of a blast pipe having an extension forming a compartment, a head for said compartment, a guide rod connected to said twyer and extending through said head, whereby said twyer may be moved into said compartment, or vice versa, and means for closing communication between said compartment and the other section of the blast pipe.

15. In a furnace, the combination with a removable twyer, of a blast pipe, a removable head for said blast pipe, and water pipes connected to said twyer and extending through and guided in said head, whereby said twyer may be removed or replaced through said blast pipe.

16. In a furnace, the combination with a removable twyer, of a bustle pipe, a blast pipe connected thereto and having a part extending beyond its connection with said

bustle pipe forming a compartment, a head for said compartment, water pipes connected to said twyer and extending through and guided by said head, whereby said twyer may be moved from operative position into said compartment, or vice versa, and means for closing communication between said compartment and the other section of said blast pipe.

17. In a furnace, the combination with a blast pipe, of a removable twyer arranged to receive the blast from said blast pipe, a seat for said twyer, means whereby said twyer may be removed from its seat, and means whereby the blast from said blast pipe may enter between the twyer and its seat as said twyer is placed into operative position on its seat.

18. In a furnace, the combination with a blast pipe, of a removable twyer arranged to receive the blast from said blast pipe, a seat for said twyer, and means whereby said twyer may be removed from its seat, the cooperating surfaces of said twyer and seat being constructed to leave a free space between them for the blast from said blast pipe when the twyer is out of operative position.

19. In a furnace, the combination with a blast pipe, of a removable twyer arranged to receive the blast from said blast pipe, a seat for said twyer, and means whereby said twyer may be removed from its seat, the cooperating surfaces of said twyer and seat being tapering so as to leave an annular space between them for the blast from said blast pipe when the twyer is out of operative position.

20. In a furnace, the combination with a blast pipe, of a removable twyer, a cooler surrounding the twyer in which it is seated, and means whereby said twyer may be removed from its seat, the cooperating surfaces of said twyer and cooler being constructed to leave a free space between them for the blast when the twyer is out of operative position.

21. In a furnace, the combination with a blast pipe, of a removable twyer, a seat for said twyer, means whereby said twyer may be removed from its seat or replaced through said blast pipe without interrupting the blast, and means whereby the blast may enter between the twyer and its seat when said twyer is out of operative position.

22. In a furnace, the combination with a blast pipe, of a removable twyer, a seat for said twyer, and means whereby said twyer may be removed from its seat or replaced through said blast pipe, the cooperating surfaces of the twyer and its seat being constructed to leave a free space between them for the blast when the twyer is out of operative position.

23. In a furnace, the combination with a

blast pipe, of a removable twyer, a seat for said twyer, a gate for a part of said blast pipe, means whereby said twyer may be removed from its seat to a position beyond said gate, or vice versa, without interrupting the blast, and means whereby the blast may enter between the twyer and its seat when said twyer is out of operative position.

24. In a furnace, the combination with a removable twyer, of a cooler surrounding the twyer in which it is seated, a bustle pipe, a blast pipe connected thereto and having a part extending beyond its connection with said bustle pipe forming a compartment, a head for said compartment, water pipes connected to said twyer and extending through and guided by said head whereby said twyer may be removed from its seat and into said compartment, or vice versa, and a gate valve for closing communication between said compartment and the other section of the blast pipe, the cooperating surfaces of said twyer and cooler being tapering so as to leave an annular space between

them for the blast when the twyer is out of operative position.

25. In a furnace, the combination with a blast pipe, of a removable twyer arranged in said blast pipe and constructed so that the blast will pass through it, means whereby said twyer may be removed from its seat, and means whereby the blast from said blast pipe may enter between the twyer and its seat when said twyer is withdrawn from its seat.

26. In a furnace, the combination with a removable twyer, of a blast pipe having a removable portion, and a rod connected to said twyer and extending through said removable portion, said rod forming a handle whereby said twyer may be removed or replaced through said blast pipe.

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

ROBERT W. McGARVEY.

Witnesses:

O. J. STEVENSON,
FRED L. TODD.