E. H. WURST.

TAPPING AND RAVELING APPARATUS FOR STEEL FURNACES AND THE LIKE.

APPLICATION FILED JUNE 23, 1919.

1,373,581.

Patented Apr. 5, 1921.

3 SHEETS—SHEET 1.

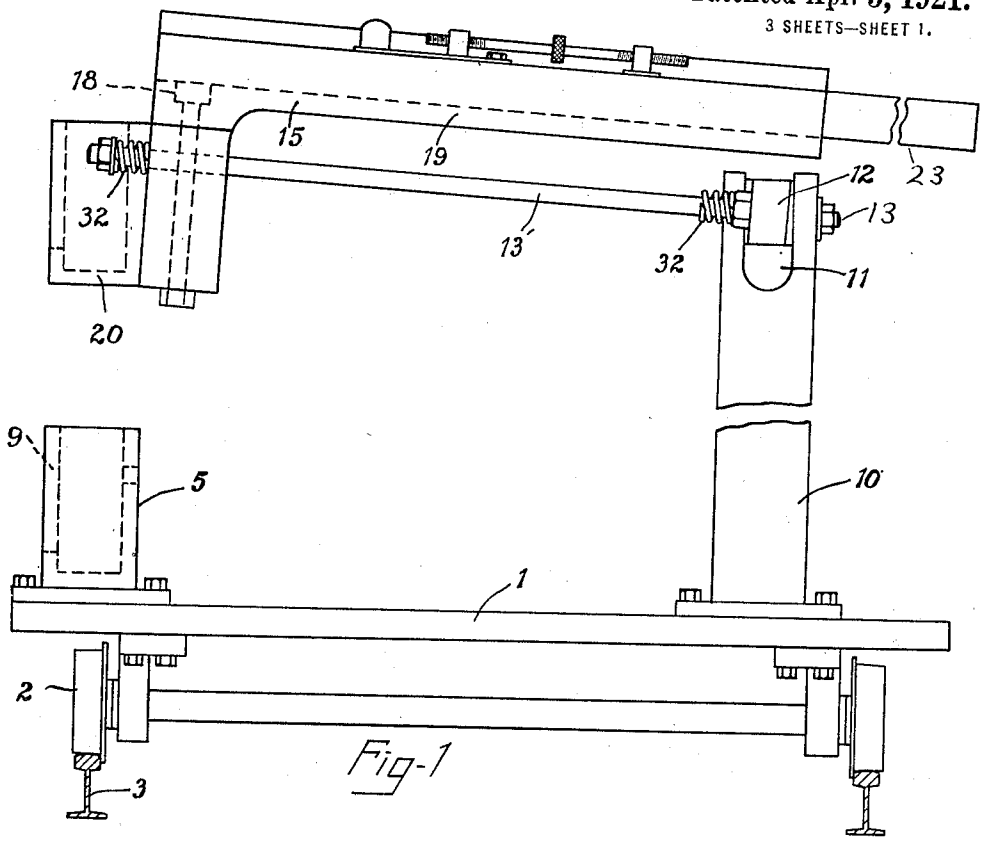


Fig-1

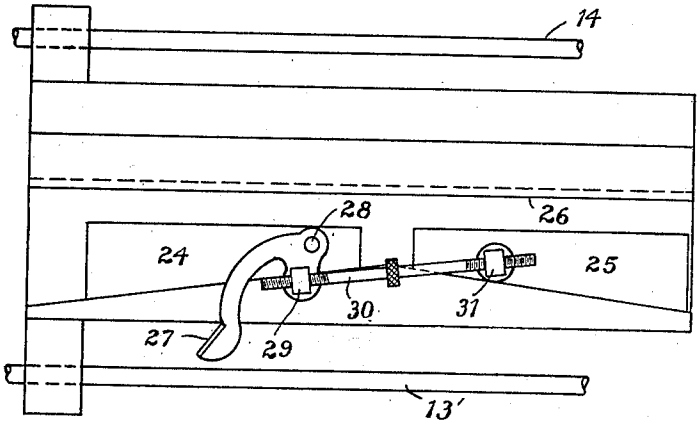


Fig-5

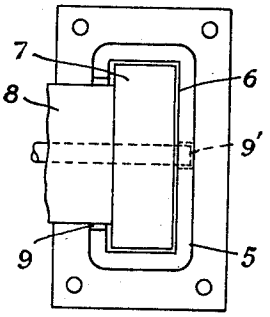


Fig-4

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INVENTOR

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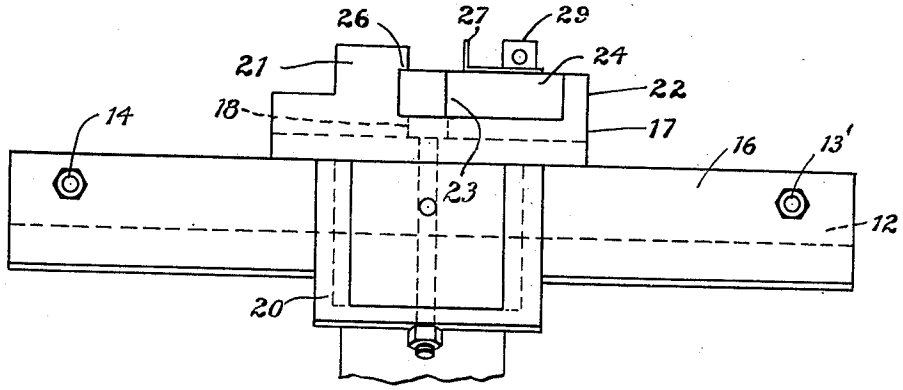


Fig-2

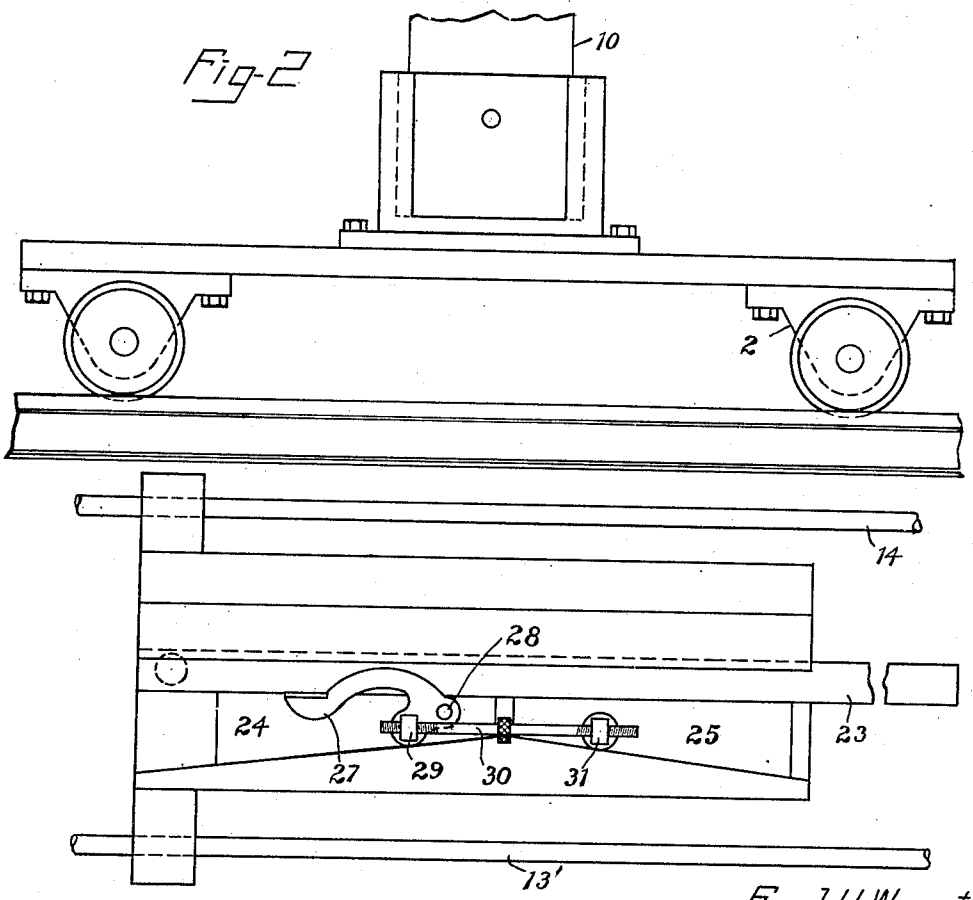


Fig-3

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3 SHEETS—SHEET 3.

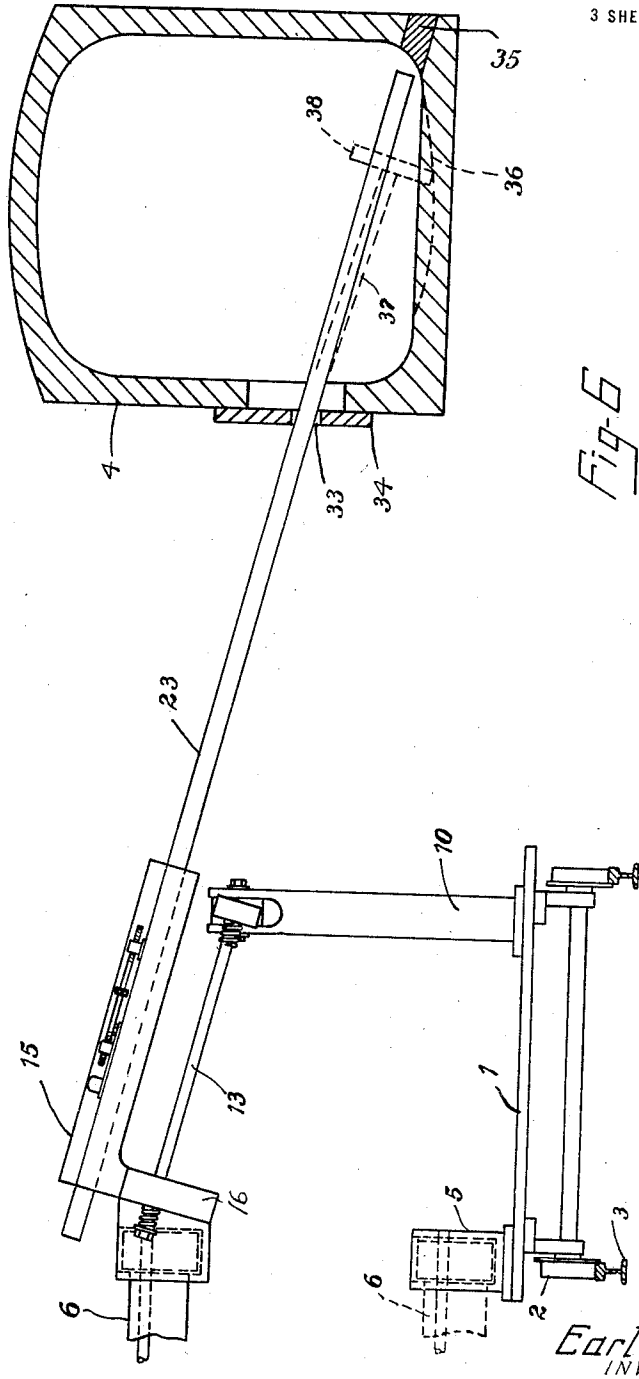


Fig-6

Earl H. Wurst
INVENTOR

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HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

EARL H. WURST, OF ELYRIA, OHIO.

TAPPING AND RAVELING APPARATUS FOR STEEL-FURNACES AND THE LIKE.

1,373,581. Specification of Letters Patent. Patented Apr. 5, 1921.

Application filed June 23, 1919. Serial No. 306,017.

To all whom it may concern:

Be it known that I, EARL H. WURST, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Tapping and Raveling Apparatus for Steel-Furnaces and the like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for performing certain operations on furnaces which have heretofore been performed by hand.

Steel and similar furnaces have tapping plugs near the base for discharging the molten metal when the heat is finished. The hole is plugged with fire-clay and similar material before the heat is commenced, and during the heating this is baked into a very hard plug. After the heat this must be removed, and it is has always been the practice, so far as I am aware, to remove as much as possible of the plug from the outside of the furnace, and then to use long rods which are inserted through holes in the furnace doors to punch the plug out from the inside. This is a laborious and disagreeable operation, on account of the great heat of the furnace. It is also an expensive operation, as the molten metal usually destroys a number of rods by the slow hand process.

Steel furnaces are lined with dolomite and similar mixtures and the metal very frequently eats out the lining on the bottom and forms a depression which retains the molten metal. In order to save this metal, and also to remove it for the purpose of later repairing the lining, it has always been the practice to use ravels, which are operated by workmen, to push the metal out of the depression and through the tapping hole. This is likewise a difficult and disagreeable operation, as it has always been performed by hand as soon as the furnace is tapped and before the metal has had time to solidify. Furthermore, the ravels are destroyed to a greater extent by the molten metal than are the plugging rods, as the operation is a slow one.

It is the object of my invention to use apparatus that will quickly perform the operations above described and the manner in which this is accomplished will now be described, reference being had to the drawings, in which—

Figure 1 is a side elevation of my improved apparatus.

Fig. 2 is an end view of the apparatus shown in Fig. 1.

Fig. 3 is a top view of a portion of the apparatus shown in Fig. 1.

Fig. 4 is a view of the attaching socket of the apparatus shown in Fig. 1.

Fig. 5 is a view of the apparatus shown in Fig. 3, but with the parts in different operative position.

Fig. 6 is a view of a section of the furnace showing my improved apparatus in operative position.

Referring to the drawings, my improvement consists of a platform 1 having suitable truck wheels 2 adapted to transport the apparatus on rails 3 in front of the furnace 4 (Fig. 6.) The platform 1 has a suitable socket 5 adapted to receive the head of the usual charging peel 6, shown in position in dotted lines in Fig. 6. This peel is one well known in the art and need not be described in detail, but it may be stated that it is attached to a crane device that may be raised and lowered, moved backward and forward and rotated for the purpose of charging the furnaces with "bottom" material, all of which is well known in the art.

The socket member 5 is arranged to receive the flange 7 of the peel 6, as shown in Fig. 4, the shank 8 of the peel extending through the front slot 9 of the socket member. By means of the socket attachment on the platform 1, the peel can be inserted and the apparatus removed from the track and deposited in any place for the purpose of using the track for the usual charging carriages.

The platform has a standard 10 secured to it, as shown in the drawings, and this standard is slotted at 11 to receive a cross bar 12, which is pivoted by a bolt 13, so that it can be tilted in the standard 10 for a purpose to be later described.

The cross bar 12 has secured at the ends rods 13 and 14, which support a movable carriage designated in its entirety by the reference character 15. This carriage is adapted to slide back and forth on the rods 13 and 14, and has a supporting cross bar 16 provided with suitable holes to receive

the rods or bars 13 and 14. The cross bar 16 supports the base 17, which is pivoted to it by means of a king bolt 18. The member 17 has a frame or supporting extension 19 extending forward over the standard 10, for the purpose of receiving the rod which is adapted to remove the plug and operate the ravel, previously referred to.

The cross bar 16 has a suitable socket 20 for receiving the flanged end of the charging peel, as shown in Figs. 1 and 2 of the drawings. This socket member 20 is similar in construction to the socket shown in Fig. 4.

The carriage 15 has a slot bounded by side members 21, 22 adapted to receive the plug rod 23 and the clamping wedges 24—25, as shown particularly in Figs. 2 and 3. The side member 21 has an overhanging lip portion 26 to extend over the rod 23, so that it will be held rigidly in place when the clamping wedges are in position, as shown in Fig 3. The clamping wedges 24 and 25 may be held in place by any means, but I have shown an eccentric lever 27 pivoted at 28 on the wedge 24, and having a standard 29 receiving a threaded rod 30, which is secured to a standard 31 pivoted in the wedge 25. The rod 30 may be threaded in either or both of the standards 29 and 31, and it may be adjusted by rotation therein. If both of the ends of the rods are threaded, obviously one end would have right hand threads and the other end, left hand threads. By rotating the handle 27 downwardly, as shown in Fig. 3, the wedges will be loosened and moved to the position shown in Fig. 5. The rod 23 can then be readily removed, or it may be inserted with the wedges in this position, or the handle rotated in the reverse direction to clamp the rod in place. The wedges and the block 21 may be roughened where they contact with the rod 23, so as to hold it firmly in place.

The supporting rods 13, 14 may have springs 32 at each end to act as bumpers when the carriage 15 is slid back and forth by the crane and peel.

The operation of my improved apparatus will now be described. The apparatus will be run forward in front of the center door of the furnace on the track and the rod 23 placed through the hole 33 in the furnace door 34 (see Fig. 6). The peel 6 of the charging crane will be placed in position in the socket member 20, and the workman will insert the rod 23 through the hole 33 and against the plug 35 in the opposite wall of the furnace, and will place the other end of the rod in the carriage 15 and clamp the same therein by manipulation of the clamping wedges, as previously described. The crane operator now moves the peel 6 backward and forward and knocks out the plug 35 and the molten metal is then discharged into the ladle positioned in the pit in the rear of the furnace to receive it. As the peel 6 is reciprocated back and forth to tap the furnace, it is given a rotary motion by the operator by the usual means such as described in my prior application, Serial #299,914 which will tend to enlarge the hole 35 and make it more or less of circular shape.

The rotation of the carriage is permitted by the pivotal arrangement between the front bar 12 and the standard 10, and the pivotal connection between the carriage 15 and the front bar 12 also permits this movement to take place without putting undue strains on the long rod or handle 23.

When the furnace is discharged of its molten metal, it may be found that a pool of metal still remains in the bottom of the furnace, due to the furnace lining being eaten out, as shown at 36 in Fig. 6. The workmen will then remove the plugging rod 23 from the carriage 15 and place the ravel handle 37, shown in dotted lines in Fig. 6, in the carriage 15, by the operation previously described. The crane operator will then cause the peel 6 to move backward and forward, which will scrape the metal out of the cavity 36 by means of the ravel plate 38, in the same way as this operation is performed by the workman. It may happen that the pool of metal remaining in the furnace is midway between the furnace doors, and the ravel may be located in this pool to force it out by extending the rod 37 through one of the adjacent doors. The pivotal connection between the carriage 15 and the cross bar 16 permits this angular position of the rod 37 to be assumed.

In Fig. 6 the furnace is shown considerably smaller, in comparison to the remaining apparatus, than it would be in practice. Also, the furnace is shown above the level of the tracks 3. This, however, is for the purpose of better illustrating the improvement, as a drawing to actual scale would render the peel attachment too small to give a clear understanding of the invention.

I have described one embodiment of my invention in more or less particularity, but this has been by way of example only, and various modifications may be made without departing from the spirit of the invention.

Having described my invention, what I claim is:

1. In apparatus of the class described, a reciprocating carriage, a support therefor, a clamp on said carriage adapted to receive a tapping rod and means for attaching a furnace peel to reciprocate said carriage.

2. In apparatus of the class described, a base member having a supporting standard, a pair of rods having means of attachment to said standard, a carriage adapted to slide

on said rods, a peel socket secured to said carriage and means for clamping a rod in said carriage.

3. In apparatus of the class described, a truck platform, a vertical standard thereon, a cross bar pivoted in said standard, rods secured to said cross bar, a carriage slidably arranged on said rods, a peel socket secured to said carriage, and means on the carriage to clamp a rod in operative position.

4. In apparatus of the class described, a truck platform, a standard thereon, a cross bar pivoted in said standard, rods secured to said cross bar, a cross head slidably arranged on said rods, a peel socket on said cross head, a platform pivoted on the cross head and clamping means on the cross head for holding a rod in position.

5. In apparatus of the class described, a truck platform, a peel socket on the platform, a standard thereon, a cross bar pivoted in said standard, rods secured to said cross bar, a cross head slidably arranged on said rods, a peel socket on said cross head, a platform pivoted on the cross head and clamping means on the cross head for holding a rod in position.

6. In apparatus of the class described, a reciprocating carriage, a support therefor, a clamp on said carriage adapted to receive a tapping rod and means for attaching a furnace peel to reciprocate said carriage, said clamp having hand operated lever.

7. In apparatus of the class described, a base member having a supporting standard, a pair of rods having means of attachment to said standard, a carriage adapted to slide on said rods, a peel socket secured to said carriage and means for clamping a rod in said carriage, said means including a pair of wedges and a hand operated lever for drawing said wedges against the clamping rod for clamping the rod in position.

In witness whereof I have hereunto set my hand this 2 day of June, 1919.

EARL H. WURST.