E. BLACKBURN.

POT DRAWING APPARATUS.

APPLICATION FILED MAR. 2, 1917.

1,235,280.

Patented July 31, 1917.

2 SHEETS—SHEET 1.

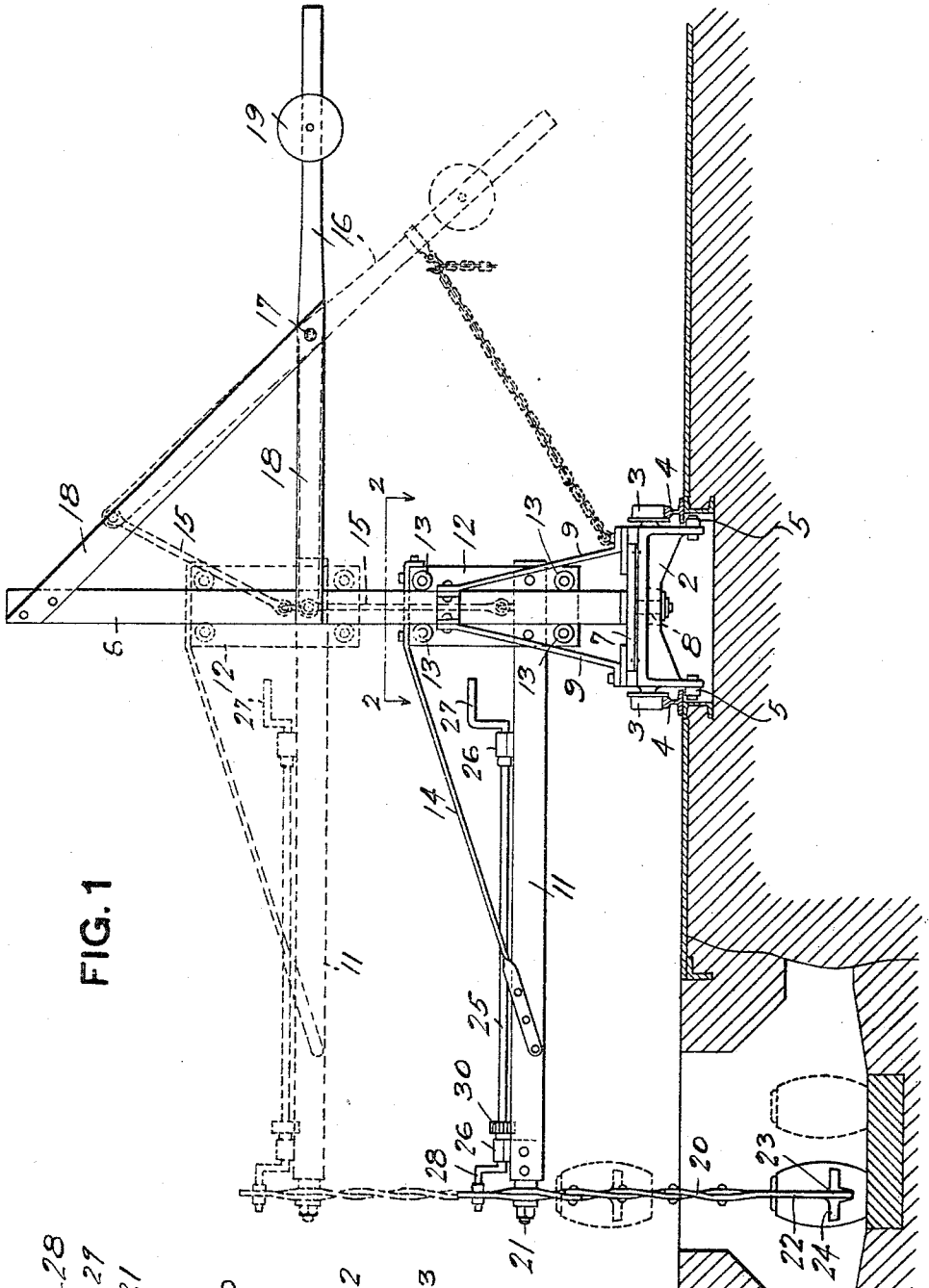


FIG. 1

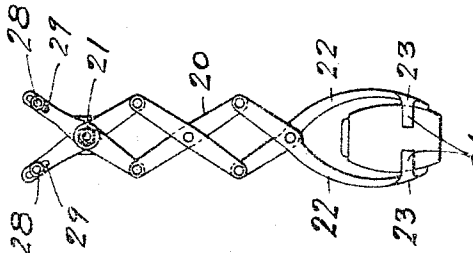


FIG. 3

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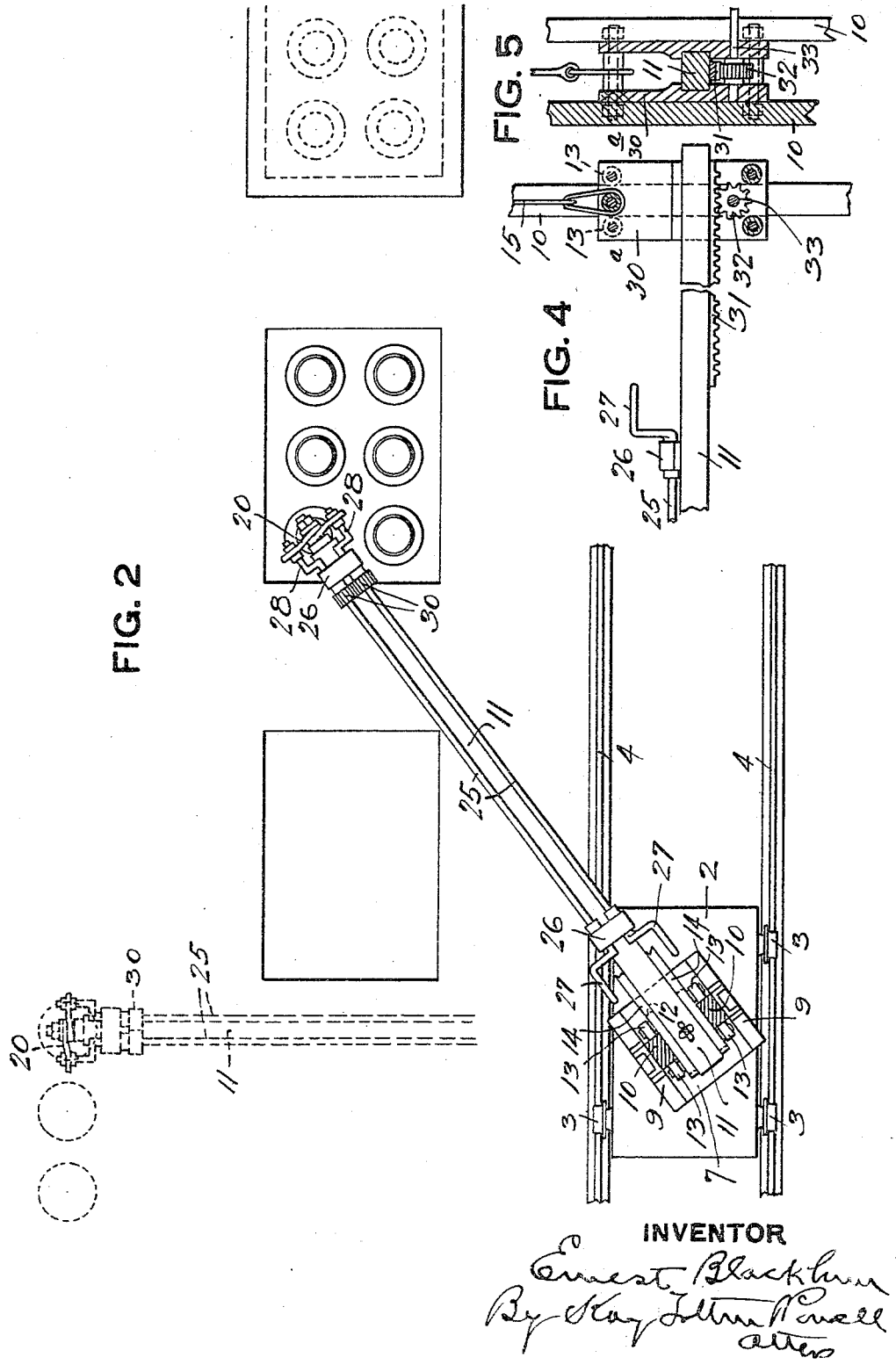
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UNITED STATES PATENT OFFICE.

ERNEST BLACKBURN, OF SHALER TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA.

POT-DRAWING APPARATUS.

1,235,280. Specification of Letters Patent. **Patented July 31, 1917.**

Application filed March 2, 1917. Serial No. 151,985.

To all whom it may concern:

Be it known that I, ERNEST BLACKBURN, a citizen of the United States, and resident of Shaler township, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Pot-Drawing Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to pot drawing apparatus, and is primarily intended as apparatus for drawing the melting pots from the melting hole of crucible steel furnaces; though the apparatus is adapted for other uses, such as a crane for lifting and handling work in other arts.

The operation of removing the pots or crucibles of molten steel from the furnace and depositing them on the furnace floor for teeming or pouring into ingot molds, as practiced in the art of crucible steel-making, is a manual operation as far as I am aware. That it to say, the work is performed by the "puller out" employing hand tongs for gripping and lifting the crucible. These crucibles are usually barrel-shaped and of smooth exterior, and are compactly and closely arranged in the melting hole. Generally six crucibles in two rows of three each are arranged in a single hole two feet square and three feet deep, and great skill is required of the "puller out" in manipulating the hand tongs to get a proper grip on the crucible, and also great labor is involved in lifting the crucibles, the dead weight to be lifted averaging well over one hundred pounds. In addition to the above difficulties, the workman must work close to the furnace opening to properly handle the tongs, and by reason of proximity to the heat of the furnace, the work is performed at a disadvantage.

The main object of my invention is to provide mechanical apparatus for drawing crucibles from the furnace which will supplant to a great extent the hard manual labor now involved in this work, and which may be conveniently and easily operated by unskilled labor, and without subjecting the operator to the heat of the furnace opening.

A further object is to so construct the apparatus that there is a minimum liability to slippage between the crucible and the gripping mechanism; and a further object is to provide great flexibility of apparatus to enable the workman to handle a variety of work.

In the accompanying drawings, Figure 1 is an end elevation of my invention as employed for drawing crucibles, the dotted lines indicating the position of parts with the crucible withdrawn from the furnace; Fig. 2 is a plan view of the apparatus, partly in horizontal section, showing a ground plan view of the furnace floor with the furnace openings, and showing in dotted lines the radial movement of the apparatus; Fig. 3 is an enlarged view of the gripping tongs; and Figs. 4 and 5 are details of a modification.

The invention is illustrated as a radial cranelike appliance adapted for movement on rails parallel with the furnace openings.

The numeral 2 indicates the truck or body portion of the device mounted on wheels 3, adapted to move on the rails 4. Rollers 5 adapted to engage the under side of the rails secure the truck against displacement, and form a lock to steady the apparatus when subjected to load.

The truck supports a vertical post or mast 6, which is mounted on a turntable 7 pivoted as at 8 to the truck body. Braces 9 connect the post and turntable and provide stiffening members to support the mast against bending at the pivotal connections. The post preferably is formed of two members 10 arranged parallel with each other and separated to form a guideway and bearing for a vertically-movable boom 11. The end of the boom engaging the post is secured to plate-like members 12 bolted or otherwise secured to the sides of the boom, and which are adapted to form a slide which is vertically-movable between the post members. The plates are provided with the rollers 13 which engage the post members and secure the boom to the post. Braces 14 connect the plates and the free end of the boom to prevent shear of the bolt connections of boom to the slide. A link 15 secured to the boom between the slide plates and the post members, forms a connection between the boom and a hand-operated lever 16 for lifting the boom. The lever is fulcrumed at 17 in a bracket 18 projecting from the post and is provided with the counter-weight 19.

It will be seen that by the above manner of connection of boom to the post, and of the lever arrangement and connection the

boom may be quickly elevated in lifting by the simple downward movement of the operating lever, and it will be seen also that the boom will remain at right angles to the post for any position that it may be elevated. This is an important feature of my invention, as in this manner of lifting a movable boom, and by reason of the pivotal connection of the post to the truck, I am enabled to obtain a direct vertical lift for any position radially of the fixed position of the truck and thus overcome the angular pull on the load which necessarily obtains in the employment of upwardly angularly swinging-booms.

The gripping mechanism for gripping and securing the crucible in lifting is connected to the free end of the boom, and comprises a tonglike structure adapted to be operated by hand for opening and closing, to engage and to disengage the crucible or work, and which is arranged so as to be operated at a point removed from the heat of the furnace opening, preferably at a point near the truck of the apparatus.

The structure shown comprises lazy tongs 20 which operate in a manner which is well understood, and I prefer to employ a structure of this nature for the reason that the jointed lever arrangement provides for great flexibility and permits of a movement which is similar in character to hand motion in grasping the crucibles. These tongs have a fixed fulcrumed connection 21 to the boom of the apparatus. The levers 22 forming the free or gripping end of the tongs terminate in T-shaped gripping jaws 23; the horizontally-extending arm portions 24 of the jaws are adapted to circumferentially engage the crucible below its bulged center, and forms a segmental seat or ring-bearing for the support of the crucible in lifting, and in this form of seat means is provided which prevents tilting of the crucible.

The tongs are connected to a pair of operating bars 25 journaled on the boom in bearings 26. These bars are adapted to be operated by hand, and have the crank handle portion 27, and the tongs crank portion 28. The crank portion 28 of the bars engages with a slot 29 in the free end of the fixed fulcrumed levers of the tongs. The bars are geared together as at 30 to provide for uniform movement of both legs of the lazy tongs, and which permit of the operation of the tongs from either side of the boom.

Other gripping mechanism may be employed in gripping the crucibles and in gripping other articles, and I do not wish to limit my invention to the exact form of mechanism shown; I prefer, however, to employ gripping mechanism which, as in the instance shown, acts to automatically grip and tighten the grip when the load is applied. It will be apparent changes may be made also in the boom and truck structure, and in the connections of the boom to the vertical retaining post without departing from the spirit of my invention. A form of structure adapted for longitudinal movement of the boom is shown in Figs. 4 and 5. In this form of structure the boom is adjustable longitudinally by mounting the boom so as to have sliding connection with the vertical slide member 30. The under side of the boom is provided with a rack-bar 31 which is adapted to engage a pinion 32 journaled in the vertical slide and operated by a handshaft 33. By this arrangement provision is made for accurately centering the gripping end of the boom in relation to the work without movement of the truck on the rails.

From the foregoing description of the invention it will be seen that I have provided an apparatus for drawing crucibles from the furnace, which by reason of its simplicity of structure and wide range of adjustment and movement, affords great flexibility and convenience in operation.

What I claim is:

1. In portable pot-drawing apparatus, the combination of a wheel-supported base having a rotatable table thereon, a vertical post comprising a pair of spaced members secured to said table, a horizontal boom operable vertically and horizontally between said members, and a lever for moving the boom vertically throughout its entire length.

2. In portable pot-drawing apparatus, the combination of a wheel-supported base having a rotatable table thereon, a vertical post comprising a pair of spaced members secured to said table, a slide between the members adapted for vertical movement thereon, a horizontal boom connected to the slide, and lever connections between the post and the boom for moving the boom vertically throughout its entire length.

3. In portable pot-drawing apparatus, the combination of a wheel-supported base having a rotatable table thereon, a vertical post comprising a pair of spaced members secured to said table, a roller slide-member adapted for vertical movement between said members, a horizontal boom connected to the slide, a lever fulcrumed to the post for elevating the boom vertically throughout its entire length.

4. In portable pot-drawing apparatus, the combination of a wheel-supported base having a rotatable table centrally mounted thereon, a vertical post comprising a pair of spaced members secured to said table, a boom, a slide vertically operable between said members, said slide comprising a pair of plates between which the boom is secured, rollers on the plates for guiding engagement with the post, and a lever fulcrumed to the post for moving the boom vertically.

5. In portable pot-drawing apparatus, the combination of a wheel-supported base having a rotatable table centrally mounted thereon, wheels on the base for engagement with a track to lock the base against tilting movement, a vertical post supported on the table comprising a pair of spaced members, a roller slide member adapted for vertical movement between said members, a horizontal boom slidably journaled in said slide, means for moving the boom longitudinally, and lever connections between the post and boom for elevating the boom.

In testimony whereof, I the said ERNEST BLACKBURN, have hereunto set my hand.

ERNEST BLACKBURN.

Witnesses:
JOHN F. WILL,
JOHN R. KELLER.

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