C. W. McCLURE & E. J. REILLY.

LIQUID METAL CHARGING CAR FOR OPEN HEARTH FURNACES.

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Patented July 23, 1918.

2 SHEETS—SHEET 1.

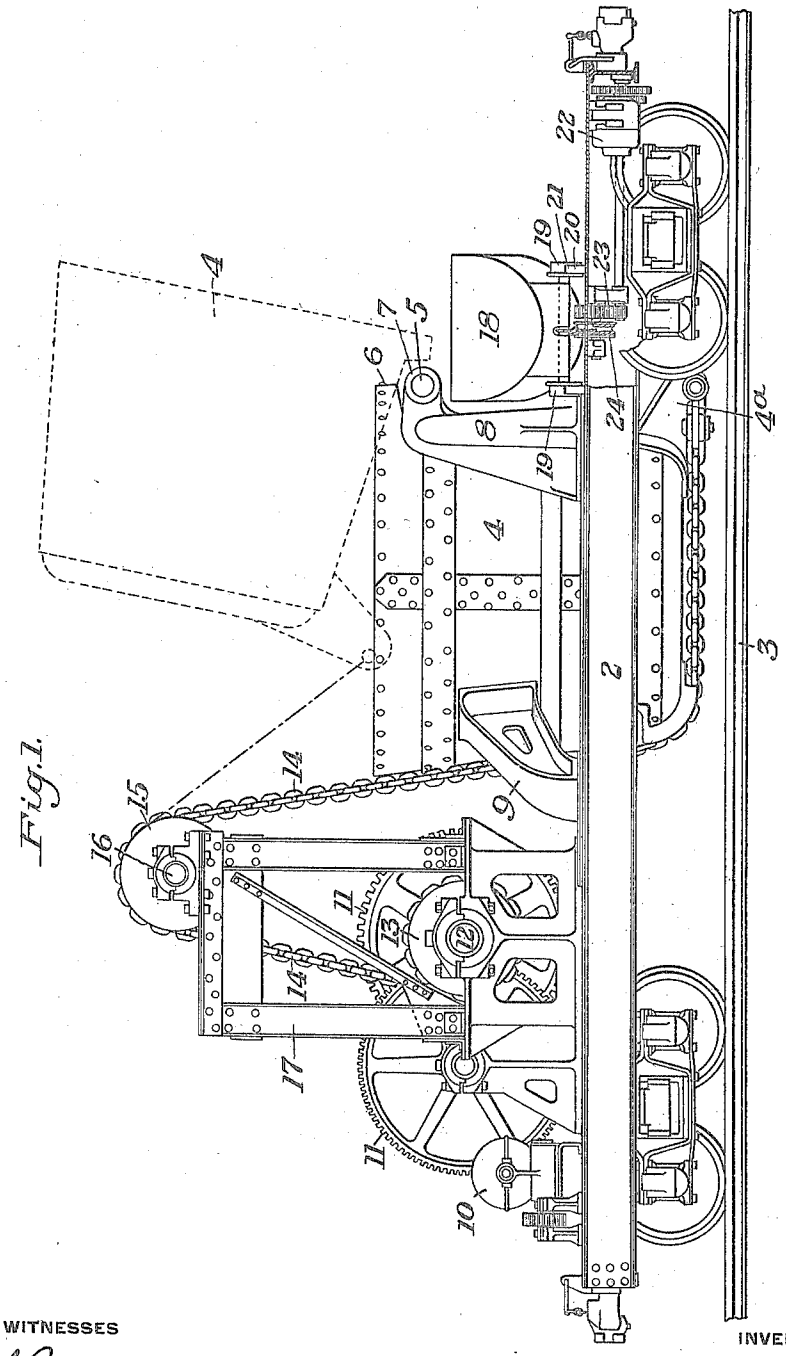


Fig. 1.

WITNESSES

R. A. Balderson

F. N. Windridge

INVENTORS

C. W. McClure

E. J. Reilly

by Behnnel, Bynner & Pannell

Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

C. W. McCLURE & E. J. REILLY.

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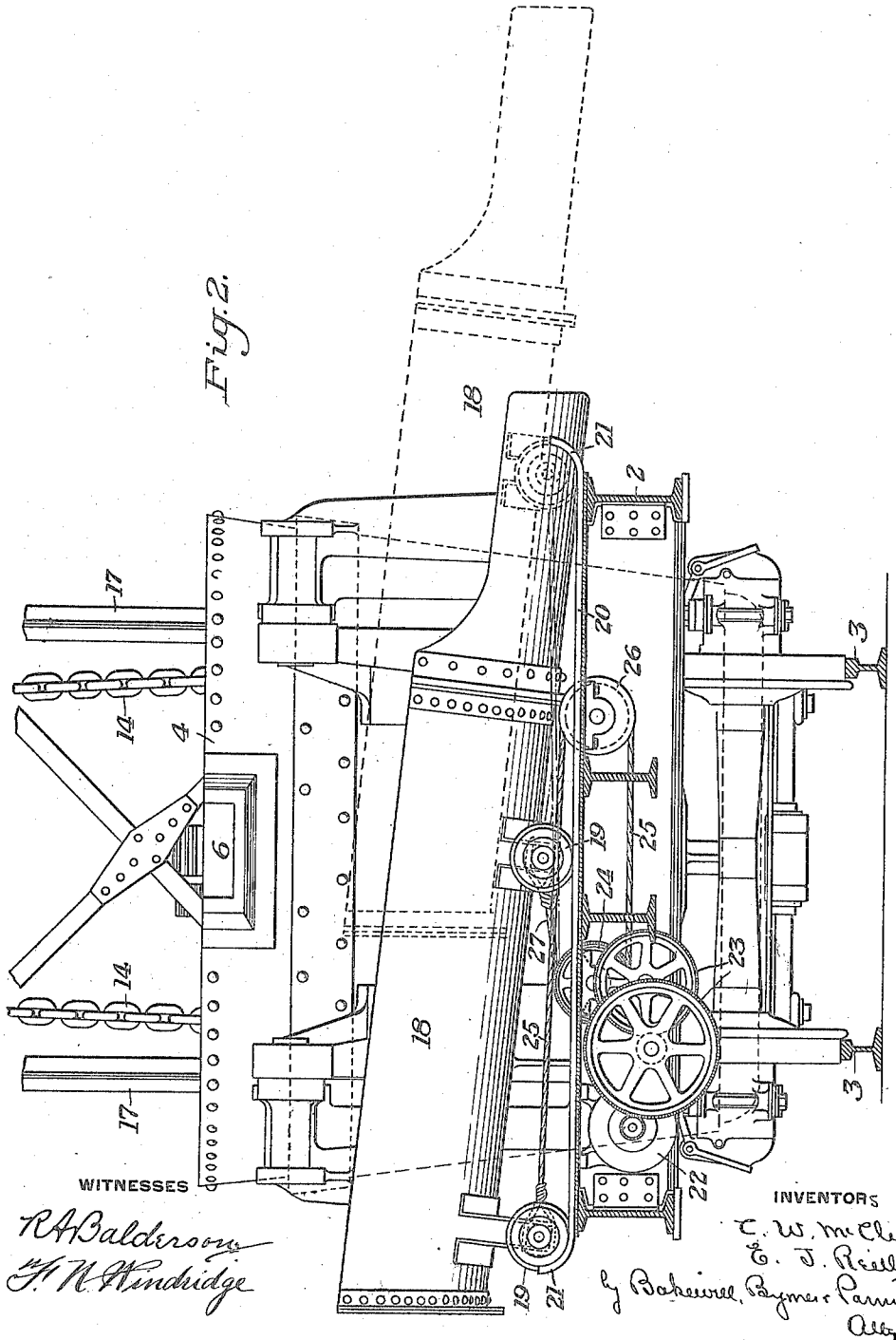
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2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

R. A. Balderson

H. N. Hindridge

INVENTORS

C. W. McClure

E. J. Reilly

by Bakewell, Paymer & Parmelee

Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES W. McCLURE AND EDGAR J. REILLY, OF YOUNGSTOWN, OHIO, ASSIGNORS TO THE WILLIAM POLLOCK COMPANY, OF YOUNGSTOWN, OHIO, A CORPORATION OF OHIO.

LIQUID-METAL-CHARGING CAR FOR OPEN-HEARTH FURNACES.

1,273,391. Specification of Letters Patent. Patented July 23, 1918.

Application filed February 23, 1918. Serial No. 218,666.

To all whom it may concern:

Be it known that we, CHARLES W. McCLURE and EDGAR J. REILLY, both citizens of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented a new and useful Improvement in Liquid-Metal-Charging Cars for Open-Hearth Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which:

Figure 1 is a side view of a charging car embodying our invention, and

Fig. 2 is an end elevation, with certain of the parts in section.

Our invention is designed to provide an improved apparatus for transferring and charging liquid metal into open hearth furnaces.

Generally considered, our invention comprises a body mounted to move on track rails adjacent to the charging door of the furnaces with which the apparatus is to be used; and a top pouring ladle tiltably mounted on the body, pouring means mounted on the body for tilting said ladle; and a spout mounted for transverse movement on the car in a position to receive the metal poured from the ladle, and arranged to be moved transversely to project its delivery end through the charging door of a furnace.

Our present invention is also designed to provide power means of simple and effective character for actuating this trough or spout.

Referring to the accompanying drawings in which we have shown the preferred embodiment of our invention and which will now be described, the numeral 2 designates the body of the charging car mounted on the track rails 3. 4 is the ladle having trunnions 5 located at the upper portion thereof adjacent to its pouring spout or lip 6 and which engage suitable bearings 7 in the posts or brackets 8 fixed to the frame of the body 2. The ladle is further supported by the brackets 9 secured thereto and which, when the ladle is in its normal horizontal position, rest upon the car, as indicated.

The ladle may be tilted to discharge its contents by any suitable mechanism.

In the drawings we have shown an electric motor 10 mounted on the car which, through a train of reduction gearing 11, drives a winding drum shaft 12. Connected to the winding drum 13 on this shaft are chains 14 which pass upwardly and over suitable guide wheels 15 mounted on a transverse shaft 16 journaled in an upward extension 17 on the car frame. From the wheels or pulleys 15 the chains pass downwardly adjacent to the rear side of the ladle, thence underneath the ladle, and are connected to lugs 4^a at the lower forward corner portions of the ladle. When the motor 10 is operated the chains 14 will be actuated to tip the ladle from the position shown in full lines in Fig. 1 to the position shown in dotted lines in said figure. When the ladle is tipped to this position the metal therein is discharged into a trough or spout 18 which is mounted in an inclined position transversely of the car 2 upon the truck wheels 19 which travel on the track 20. The end portions of this track are bent upwardly, as indicated at 21, to form stops for limiting the travel of both wheels in both directions.

In accordance with our present invention we mount upon the car another electric motor 22 which is connected to a train of reduction gearing 23 with a winding drum 24. 25 is a flexible connection, such as a rope or cable, which is connected at one end to the spout or trough 18 and extends thence forwardly and around an idler pulley or sheave 26 mounted on the car body 2; and thence rearwardly to the winding drum 24 to which its other end is connected. 27 designates a second flexible connection attached at one end to the intermediate portion of the spout 18 and extending thence to the winding drum 24 to which its other end is attached.

In operation, after the ladle 4 receives a supply of liquid metal, the car is moved along the track rails 3 to a position adjacent to the furnaces to be charged. The motor 22 is operated in a direction to pull on the rope or cable 25 and thereby move the spout or trough 18 from the position shown in full lines in Fig. 2 to the position shown in dotted lines in said figure. When in this dotted line position, the delivery end

of the spout or trough is moved through the door of the furnace to be charged. The ladle 4 is then tipped and emptied into said trough which delivers the liquid metal into the furnace.

After the charging operation is completed the motor 22 is reversed thereby pulling on the cable 27 and slacking the cable 25. This draws the spout back to its normal position.

It will be noted that the entire operation can be carried out without the use of a crane or a separate charging machine and that it can be made to serve a number of open hearth furnaces built in line with each other.

It will also be noted that the pouring lip of the ladle is located substantially on the line of the axis of its trunnions. This gives a short or low pour, the fall of metal being confined to the short drop between the pouring lip and the trough. This eliminates the loss of metal by splashing which is ordinarily suffered when the longer drop of the old method is employed.

The entire apparatus is simple in its construction and can be operated much more conveniently than can the apparatus ordinarily employed, wherein a ladle car is used which is arranged to enter the open-hearth building at one end thereof for a short distance, together with a charging machine movable in front of the charging doors of the furnace, a charging spout arranged to be picked up by the charging machine and carried to and projected into the open charging door of the furnace to be charged, and a crane which can be operated to remove the ladle from the ladle car and carry it to pouring position with respect to the charging spout. This crane then tilts the ladle and discharges the metal into the charging spout and thence into the furnace.

The present application is in part a continuation of our application Serial No. 173,751, filed June 9, 1917.

We claim:

1. A liquid metal charging car for open-hearth furnaces, comprising a car adapted to be moved adjacent to the charging door of the furnace, a ladle tiltably mounted on the car, a transversely arranged spout or trough arranged to receive the metal from the ladle, and means for moving said spout or trough transversely of the car to project its delivery end into charging relation to the furnace, substantially as described.

2. A liquid metal charging car for open-hearth furnaces, comprising a car adapted to be moved adjacent to the charging door of the furnace, a ladle pivotally mounted on the car, an inclined spout or trough mounted on the car and arranged to receive the metal from the ladle, and means whereby said spout or trough may be moved transversely of the car to project the discharging end thereof beyond the side of the car and into charging relation to the furnace, substantially as described.

3. A liquid metal charging car for open-hearth furnaces, comprising a car adapted to be moved adjacent to the charging door of the furnace, a ladle tiltably mounted on the car, power-actuating means carried by the car for tilting the ladle, a carriage mounted for movement transversely on said car, a trough or support mounted on said carriage and adapted to receive the metal discharged by the ladle, and means whereby the carriage may be moved to project the discharging end of the spout or trough beyond one side of the car, substantially as described.

4. A liquid metal charging car for open-hearth furnaces, comprising a movable support, a tiltable ladle mounted on the support, a motor also mounted on the support, and actuating connections between the motor and the ladle for tilting the ladle, said connections including a winding drum, gearing for actuating the drum, and a flexible member connected to the drum and passing downwardly at the rear side of the ladle and underneath and across the bottom of the ladle and connected to the lower forward portion thereof, substantially as described.

5. A liquid metal charging car for open-hearth furnaces, comprising a movable support, a charging spout or trough movable on said support, a tiltable ladle also mounted on the support, a motor mounted on the car, and actuating connections between the motor and the ladle for tilting the ladle, said connections including a reduction gearing, a winding drum and chains connected to said drum and passing downwardly and underneath the ladle and connected to the lower forward portions of the ladle, substantially as described.

6. A liquid metal charging car for open hearth furnaces, comprising a car adapted to be moved adjacent to the charging door of the furnace, a ladle tiltably mounted on the car, a transversely arranged spout or trough arranged to receive the metal from the ladle, a reversible motive device mounted on the car, and connections actuated by said motive device whereby the spout or trough may be moved transversely of the car; substantially as described.

7. A liquid metal charging car for open hearth furnaces, comprising a car adapted to be moved adjacent to the charging door of the furnace, a ladle tiltably mounted on the car, a transversely arranged spout or trough arranged to receive the metal from the ladle, a motive device mounted on the car, a winding drum geared to said motor, and flexible connections between said drum

and the spout or trough for moving the same; substantially as described.

8. A liquid metal charging car for open hearth furnaces, comprising a car adapted to be moved adjacent to the charging door of the furnace, a ladle tiltably mounted on the car, a transversely arranged spout or trough also mounted on the car and arranged to receive the metal from the ladle, a motive device on the car, a winding drum geared to said device, a flexible connection from said drum to the rear portion of the spout or trough, and another flexible connection from said drum to another portion of the spout or trough, said motive device, drum and connections providing means for moving the spout or trough transversely back and forth on the car; substantially as described.

In testimony whereof we have hereunto set our hands.

CHARLES W. McCLURE.
EDGAR J. REILLY.

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