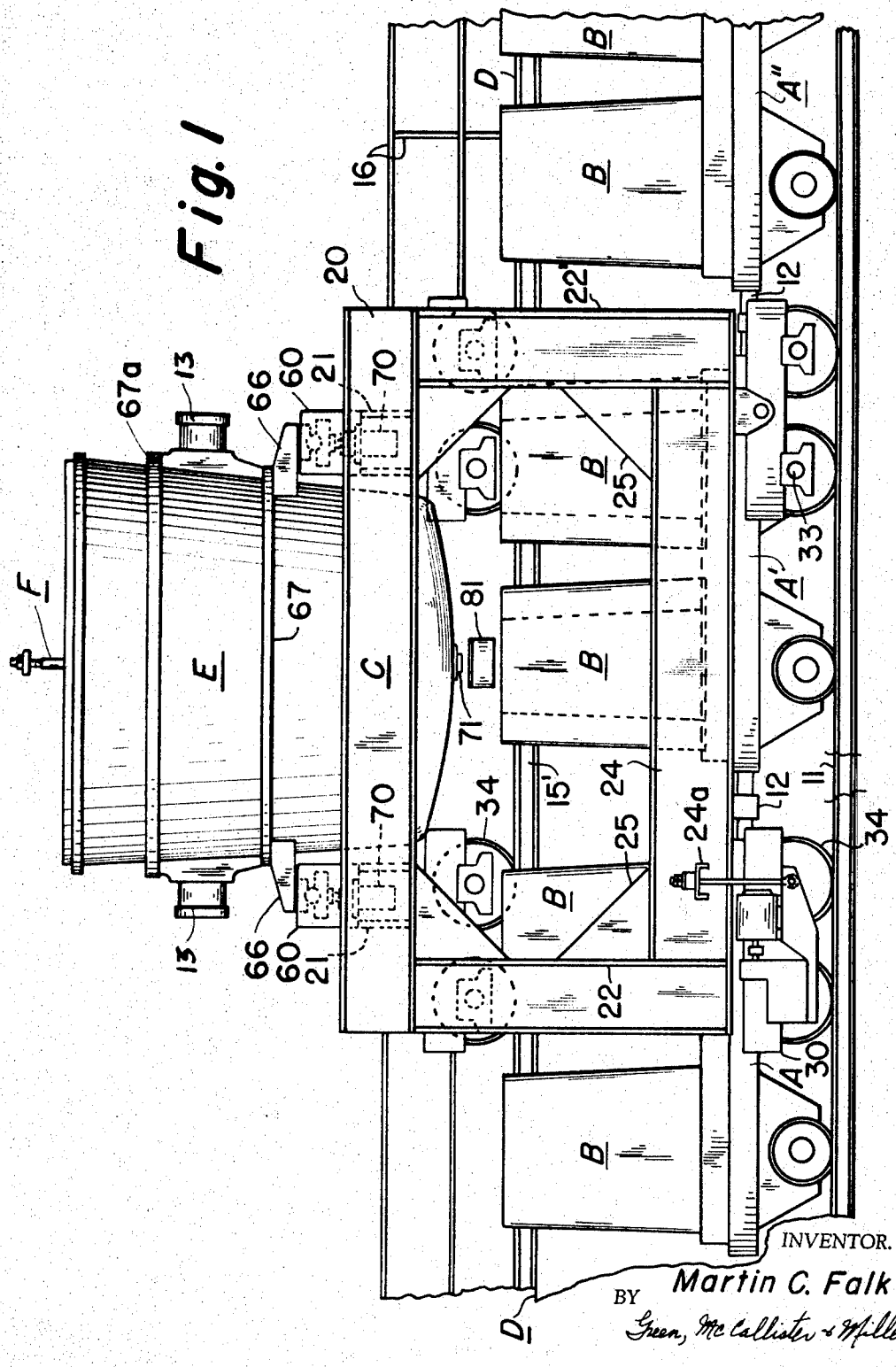
April 1, 1969 M. C. FALK 3,435,882

GANTRY CAR APPARATUS FOR CASTING MOLTEN METAL

Filed June 20, 1966 Sheet 1 of 6

Fig. 1



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GANTRY CAR APPARATUS FOR CASTING MOLTEN METAL

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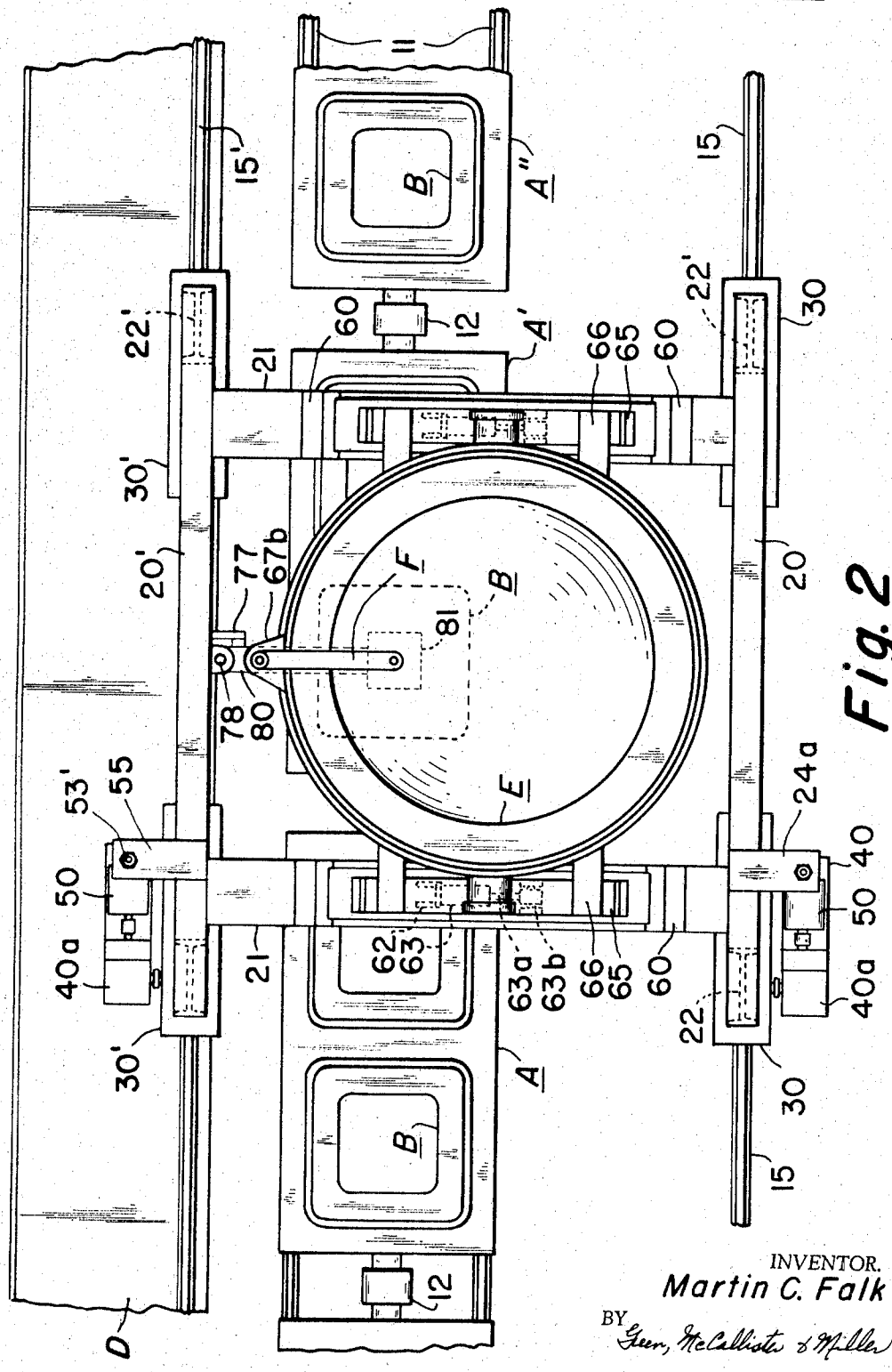


Fig. 2

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GANTRY CAR APPARATUS FOR CASTING MOLTEN METAL

Filed June 20, 1966 Sheet 3 of 6

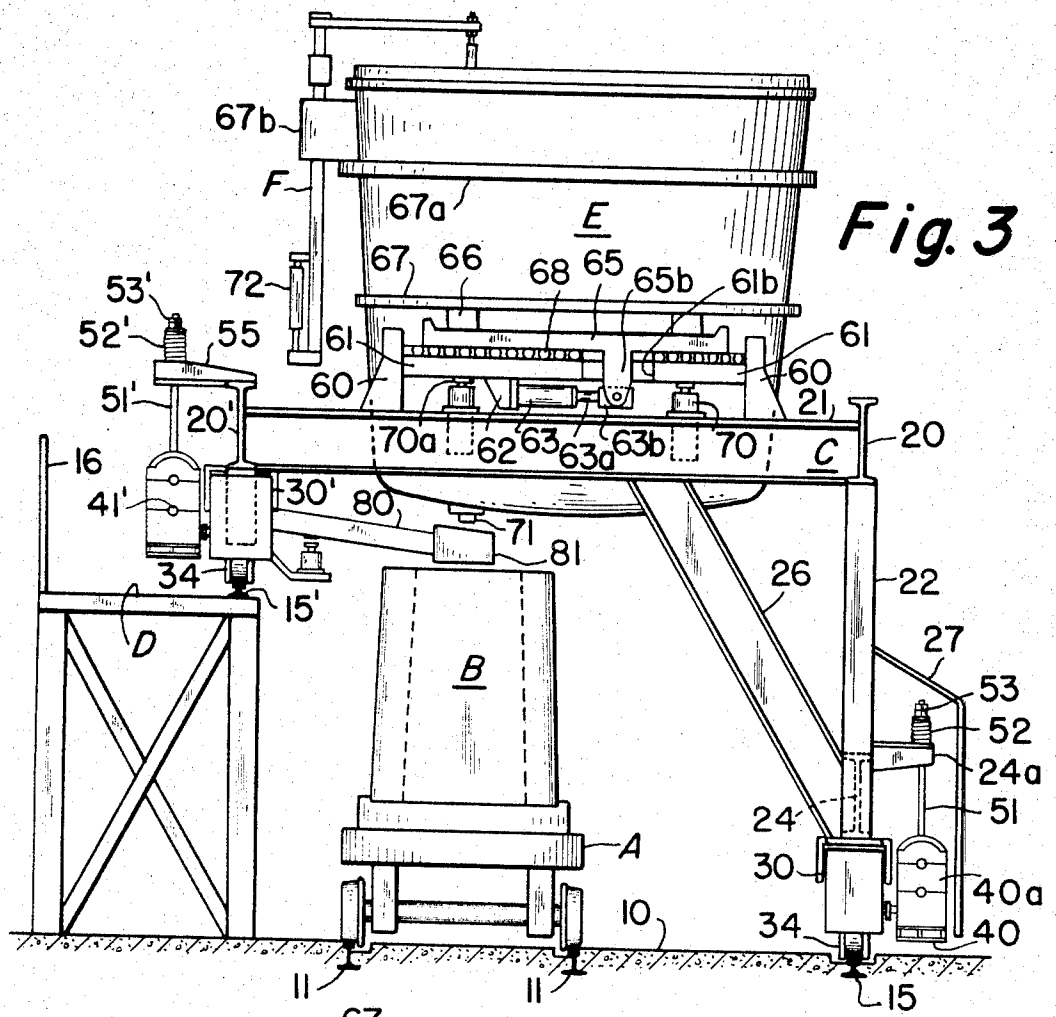


Fig. 3

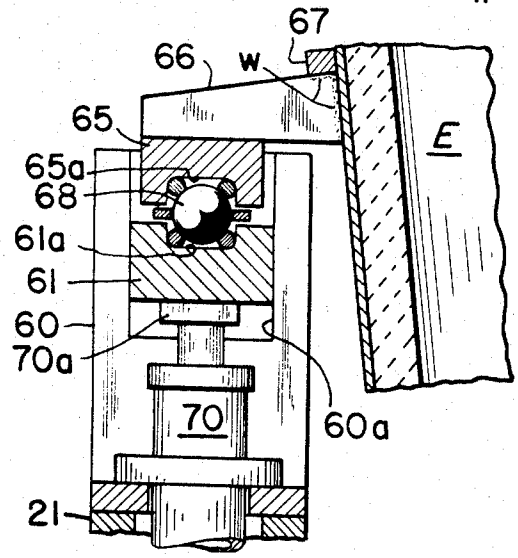


Fig. 4

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GANTRY CAR APPARATUS FOR CASTING MOLTEN METAL

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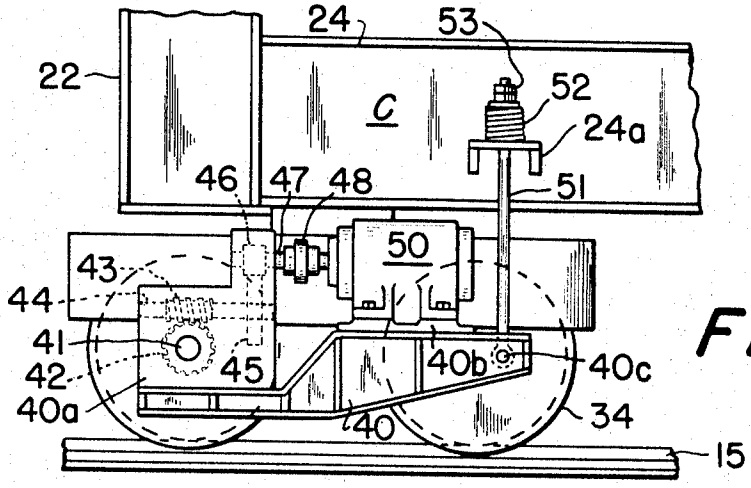


Fig. 5

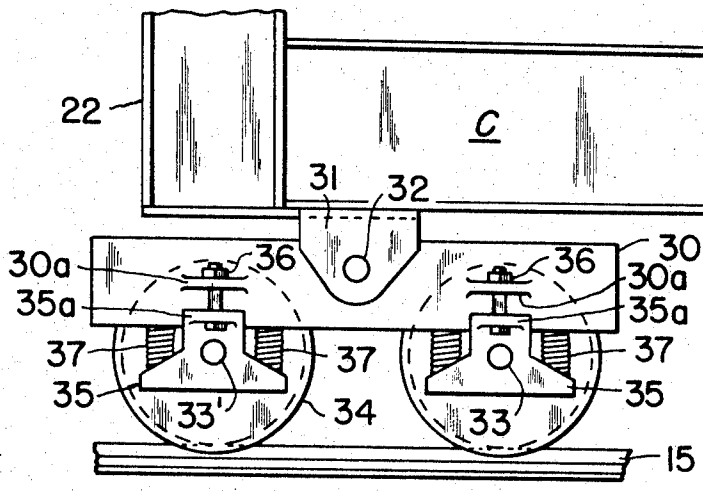


Fig. 6

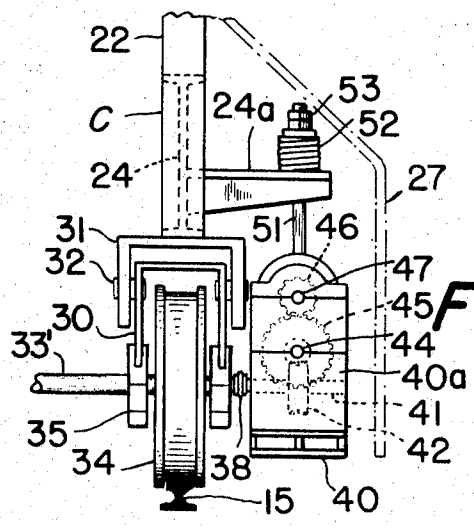


Fig. 7

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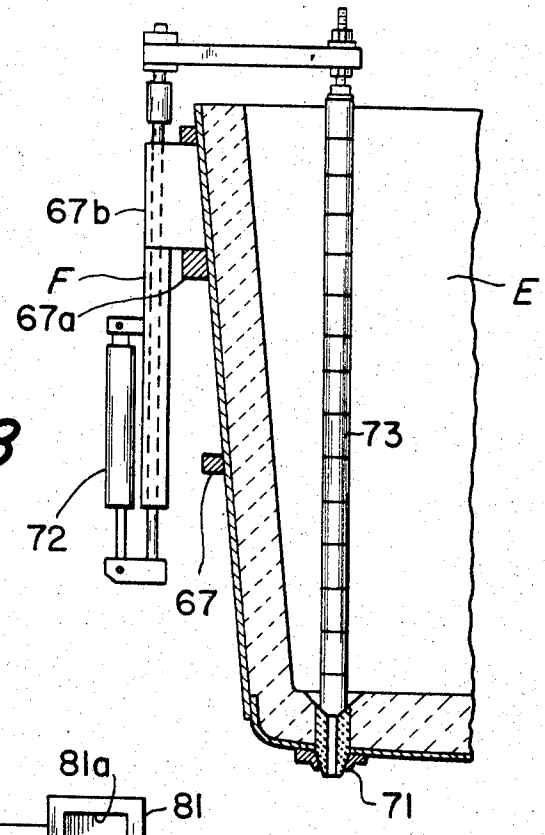


Fig. 8

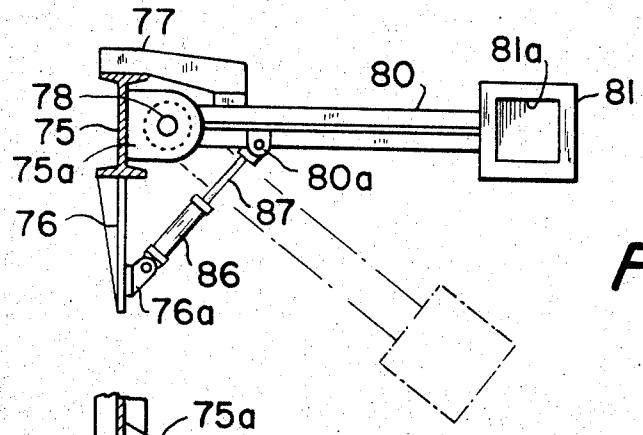


Fig. 9

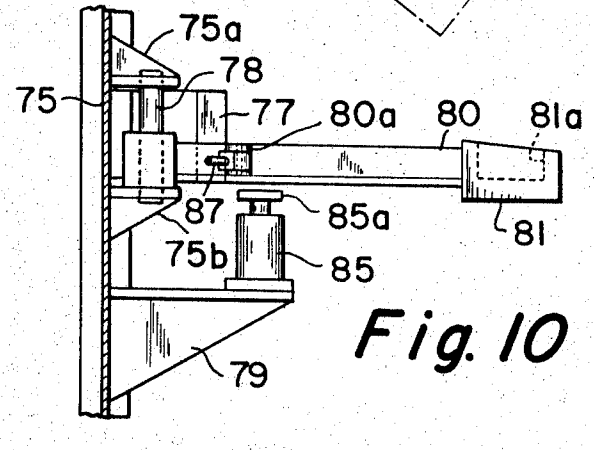


Fig. 10

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GANTRY CAR APPARATUS FOR CASTING MOLTEN METAL

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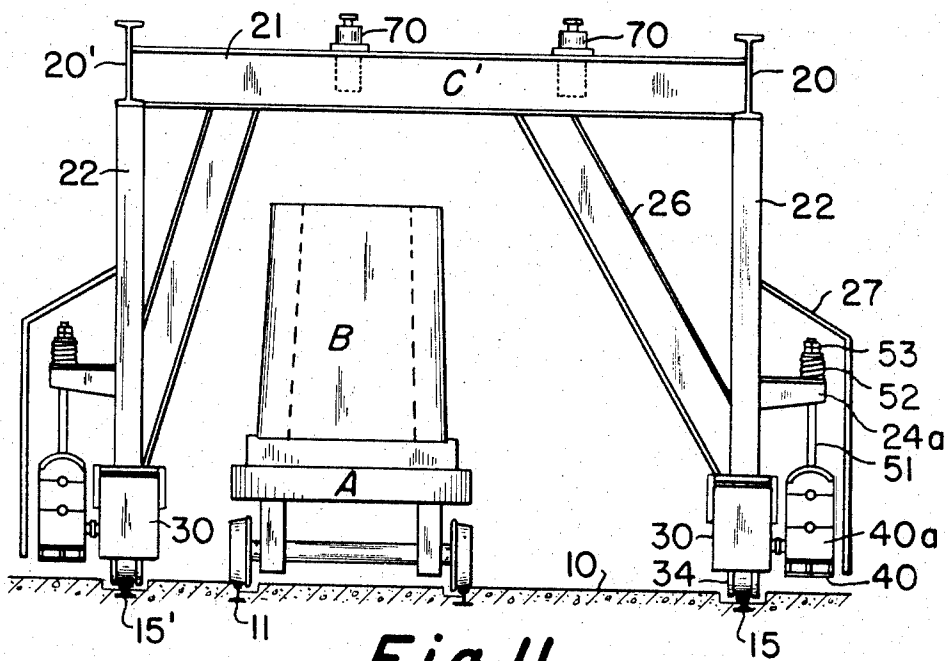


Fig. 11

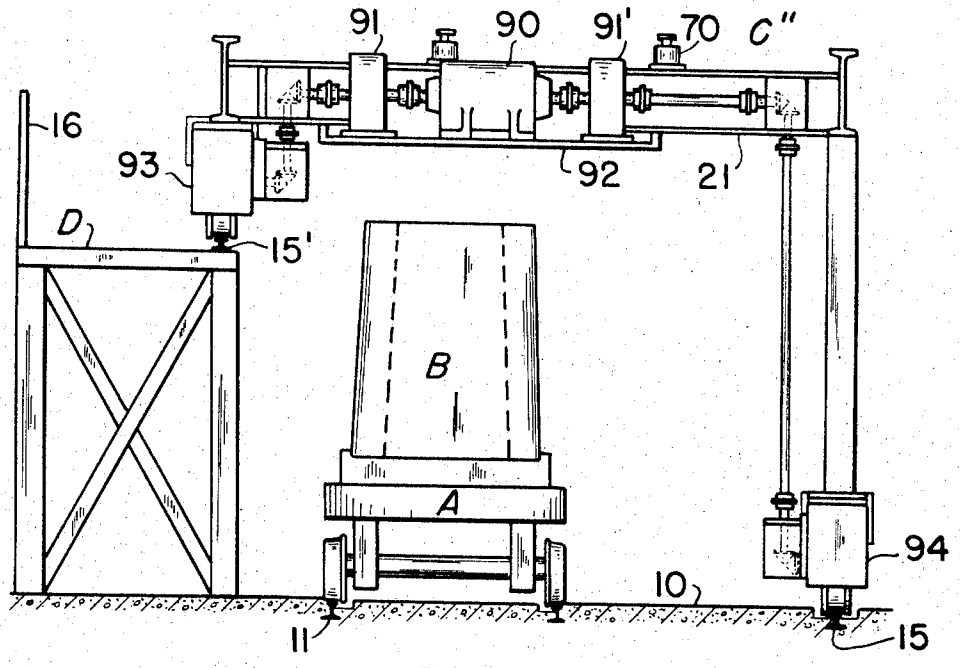


Fig. 12

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United States Patent Office 3,435,882
Patented Apr. 1, 1969

3,435,882

GANTRY CAR APPARATUS FOR CASTING MOLTEN METAL

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Filed June 20, 1966, Ser. No. 558,789
Int. Cl. B22d 39/00, 33/02, 37/00
U.S. Cl. 164—323
14 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for handling refined molten metal on a plant floor including, a first longitudinal trackway along the floor, a series of ingot cars on said trackway for carrying ingot molds, a second longitudinal trackway extending along the floor in a transversely-outwardly spaced relation with respect to said first trackway, a gantry car constructed for movement along said second trackway in an overhead straddling relationship with respect to said first trackway and the ingot cars and ingot molds thereon, a ladle carried on said gantry car having a bottom pouring spout, means for moving said gantry car along said second trackway from a molten metal receiving station to an ingot mold filling station, and means for aligning the pour spout of said ladle with a succession of the ingot molds that are advanced along said first trackway on said ingot cars.

This invention relates to apparatus for receiving and handling molten metal, such as steel, that has been subjected to melting and refining in a furnace vessel, such as in an oxygen converter. A phase of the invention pertains to an improved teeming ladle apparatus and another phase to a system for receiving, pouring and casting molten metal that is to be formed into ingots

. The present invention deals with improving the handling of molten metal, particularly from the standpoint of a teeming ladle and associated ingot molds. It deals with the cooperative utilization of teeming ladle apparatus and ingot mold apparatus and with providing an improved efficiency of handling molten metal which has been previously melted and refined and is to be formed into suitable cast shapes, as in ingot molds.

It has been an object of the invention to devise a new and improved operating system for handling molten metal that is to be solidified into a suitable shape or shapes as in the form of an ingot;

Another object of the invention has been to devise a system or apparatus for providing an improved and more effective cooperative utilization of a teeming ladle and ingot molds that are adapted to be filled with molten metal from the ladle and to cast the metal in the form of ingots;

Another object of the invention has been to devise an improved teeming ladle for molten metal which will have an increased efficiency in utilization;

A still further object of the invention has been to develop a flexible apparatus system which will minimize the plant space required, which will provide an improved cooperative functioning relationship between molten metal pouring means, such as a teeming ladle, and a group of molten metal receiving, forming or casting means, such as a group of ingot molds;

These and other objects of the invention will appear to those skilled in the art from the illustrated embodiments and the claims.

In the drawings, FIGURE 1 is a side view in elevation showing an operating system or apparatus constructed and utilized in accordance with the invention; in this

figure, a teeming ladle is illustrated as carried on a longitudinally moving gantry truck or car for both receiving molten metal from a furnace vessel and for pouring or discharging the molten metal into a progressive series of molds which, in themselves, are illustrated as movable in the same longitudinal line and within confines of the ladle car;

FIGURE 2 is a top plan view on the scale of FIGURE 1 further illustrating the apparatus of such figure;

FIGURE 3 is an end view in elevation on the scale of FIGURES 1 and 2, taken from the left end of the operating line of such figures, and particularly illustrating the cooperative relationship between the teeming ladle and an ingot mold;

FIGURE 4 is an enlarged side elevational section taken centrally of FIGURE 3 and illustrating means for removably, adjustably and resiliently supporting the teeming ladle on its gantry car;

FIGURE 5 is an enlarged fragmental side elevation on the scale of FIGURE 4 and illustrating details of the construction and mounting of a drive mechanism for a wheeled truck of a gantry car which is also illustrated in the left-hand bottom portions of FIGURES 1 and 2;

FIGURE 6 is a fragmental side view in elevation on the scale of FIGURE 5 and showing the wheeled truck with its driving means removed to better illustrate its suspended mounting from the gantry car;

FIGURE 7 is a fragmental end view in elevation on the scale of FIGURE 5 showing the apparatus of and taken from the left-hand side of such figure;

FIGURE 8 is a fragmental end section in elevation on the scale of FIGURES 4 to 7, inclusive, illustrating a pouring nozzle and inside-operating stopper assembly for the teeming ladle of FIGURES 1 and 2;

FIGURE 9 is a fragmental horizontal sectional detail on the scale of FIGURE 8 and illustrating an auxiliary stopper apparatus for the pouring nozzle of FIGURE 8;

FIGURE 10 is a fragmental sectional detail in elevation on the scale of and of the apparatus of FIGURE 9;

FIGURE 11 is an end view in elevation on the scale of and similar to FIGURE 3, with the teeming ladle removed for clarity and illustrating a modified embodiment of a gantry car for the teeming ladle;

And, FIGURE 12 is a view similar to and on the scale of FIGURE 11 showing a further embodiment of a teeming ladle car.

In carrying out the invention, a group or progressive longitudinal line of ingot cars or trucks A, A′ and A″ are positioned for movement along a trackway **11** that may be located on the plant floor **10**, with each car carrying a pair of ingot molds B in an upright position thereon for movement therewith. The cars A, A′ and A″ are provided with a conventional disconnect type of coupling **12**, in order that they may be progressively advanced along the transversely spaced-apart rails of the longitudinal trackway **11** into and out of a cooperative aligned and pour-receiving position with respect to a bottom pouring nozzle **71** of a teeming ladle E. In this connection, the cars A, etc., may be advanced by any suitable means, such as a motor-driven pusher or a pulling tractor, and after they have ben filled, may be disconnected, as desired, and move to any suitable plant location for the ingot stripping operation.

Further, in accordance with the invention, the teeming ladle E is removably-supported and centrally-carried on a gantry car C in an overhead position with respect to the ingot molds B and, as particularly illustrated in FIGURES 2 and 3, in such a manner as to straddle such molds, their cars A, etc., and thus permit their free independent longitudinal movement.

A heavy charge of melted and refined molten metal may be poured into the wide open mouth of the teeming

ladle E at a pouring station by, for example, tilting the furnace vessel. At this time, stopper assembly F of the ladle has its plunger or stopper **73** in a position to close-off its pouring nozzle **71**. The gantry car C may then be employed to move the ladle E along the longitudinal rails **15** and **15'** of its trackway to an ingot filling or pouring station. It will thus be apparent that a group or series of ingot molds B of much lesser capacity than the ladle E can be successively or progressively advanced and filled by opening the stopper assembly F as each individual ingot mold B is moved to an underpositioned, aligned relation with the pouring nozzle **71**. As shown particularly in FIGURES 3, 11 and 12, the gantry car C, C' or C'' has an overhead support frame shown of rectangular shape and is adapted to carry the ladle E in its central opening spacing. As shown particularly in FIGURE 3, the gantry car C has fluid motor means **63** for moving or adjusting the ladle E transversely or horizontally with respect thereto to align its nozzle **71** centrally with the ingot molds B and fluid motor means **70** to cushion the ladle when it is placed on the support frame and carried thereby.

The gantry car C, C' or C'', is constructed for longitudinal movement along transversely-outwardly-spaced rail members **15** and **15'**, at least one of which **15** is shown positioned along the plant floor **10**. In the embodiments of FIGURES 3 and 12, the other rail member **15'** is positioned on a vertically-upwardly-extending and longitudinally-projecting, stationary support platform D, rather than on the plant floor, as shown in the embodiment of FIGURE 11. The cars C and C'' are thus of a cantilever type or inverted L-shape and the car C' is of a U-shape. As illustrated, the platform D is provided with an outer, vertically-extending railing **16**. In all embodiments, the gantry car is shown as motor driven for movement along its trackway in an enclosing or spanning relation with respect to the ingot molds B, their associated trucks A, etc., and the trackway **11**.

The gantry car C illustrated in FIGURES 1, 2 and 3, like the embodiments of FIGURES 11 and 12, has an overhead horizontal support frame provided by opposed, horizontal I-beam side frame members **20** and **20'** and by connected, opposed I-beam end framing members **21** to form a substantially rectangular frame structure that is centrally open to receive the lower end of the teeming ladle E therethrough. The overhead frame is carried by a pair of transversely spaced-apart side or vertical frames. One side frame of major extent of the gantry cars C and C'' and both said frames of major extent of the gantry car C' has a pair of upright I-beam framing members **22** and **22'**, see FIGURES 1 and 2. The side framing defines open end spaces beneath the overhead support frame. The upright beam members **22** and **22'** are connected by a bottom, horizontally-extending, side E-beam member **24** to define a side rectangular frame. In FIGURE 1, diagonal, corner, reinforcing members **25** extend between the bottom side member **24** and the upright members **22** and **22'**. Diagonal end braces **26** may, as shown in FIGURE 3, extend from bottom end portions of the upright members **22** and **22'** to the end beams **21** of the upper frame. This provides a strong framing beam construction for supporting the heavy weight of the teeming ladle E and of the molten metal charge that is to be carried thereby. As shown in FIGURE 3, a protective skirt or hood of plate-like construction may be secured to project from the upright beam member **22** to protect driving motor means for a bottom truck **30** of the gantry car C.

As shown particularly in FIGURES 2 and 3, one end of the gantry car C is provided with a back end pair of motor-driven wheeled trucks **30** and **30'** which are of similar construction, but have a different positioning with respect to the frame, in that the truck **30** is mounted adjacent a lower portion of the frame for movement along the floor rail **15**, while the truck **30'** is positioned for movement along platform rail **15'** and is carried by the upper framing of the car. Thus, a description of the construction of one truck such as **30** and its driving means will suffice to illustrate the other truck **30'** and its mounting means. Referring particularly to FIGURES 1, 6 and 7, the truck **30** is adapted to carry a pair of cross-extending axle shafts **33** and **33'** with their corresponding flanged wheels **34** which may be secured for rotation with the shafts. Each axle **33** and **33'** is suspended at its ends at opposite sides of the truck **30** by a shock-absorbing spring mounting which utilizes a mounting lug **30***a* projecting from a side of the truck, a mounting block **35** within which each axle is rotatably positioned, and an outwardly-projecting lug **35***a* adjacent the top end of each block **35**. A nut and bolt assembly extends between the lugs **30***a* and **35***a* to suspend each block **35** from inverted U-shaped truck body **30** (see FIGURE 7), and a pair of oppositely-positioned coil springs **37** are carried by each block **35** to abut the under side of the truck **30**.

What may be termed the back axle shaft **33'** is driven in a manner shown particularly in FIGURES 1, 2, 5 and 7, by a reversible electric motor **50** which is bolted on a front platform portion **40***b* of a platform **40** which at its back end, is carried on a driven axle shaft **41** and, at its opposite or front end, is suspended from the side beam member **24** by a suspension rod **51**. It will be noted that the rod **51** has an eyelet at its lower end through which a pivot pin **40***c* carried by the platform **40** extends and, at its upper end, is resiliently-carried on a side bracket extension **24***a* from the beam member **24** by means of a spiral spring **52** and nut assembly **53**. The nut assembly **53** enables adjustment of the tension of the spring **52**. With reference to the truck **30'**, a side bracket or arm **55** extends from the beam member **20'** and corresponds in functioning to the side bracket **24***a* for the truck **30**.

The back end portion of the platform **40** carries a gear housing **40***a* which has the drive shaft **41** that is connected through a coupling **38** to the driven axle shaft **33'** (see FIGURES 5 and 7). The axle shaft **33'** is, at its ends, rotatably-carried in a pair of the mounting blocks **35** that are suspended from the U-shaped truck **30** which, in turn, is pivotally-carried by a pair of pins **32** (see FIGURES 6 and 7) from within a bifurcated or inverted U-shaped mounting bracket **31**. The bracket **31** is secured to and projects from the bottom flange of the lower beam member **24**. This is the same mounting that is employed for the non-driven shafts **33** of the trucks **30**.

As shown particularly in FIGURES 5 and 7, the drive shaft of the motor **50** is adapted to actuate an extension shaft **47** by means of a coupling **48**. The extension shaft **47** carries a drive pinion **46** thereon within the housing **40***a* which meshes with a gear **45** secured on one end of an intermediate drive shaft **44** which is also carried within the housing **44***a* and which, at its back end, has a drive worm **33** thereon. The drive worm **33** is adapted to mesh, as shown particularly in FIGURE 5, with a worm gear **42** which is feathered or secured on the shaft **41** to actuate it and thus, in turn, to actuate the axle shaft **33'** and its associated pair of flanged wheels **34**. With reference to FIGURE 3, the mounting and the construction of the drive mechanism for the upper truck **30'** is the same as that of the lower truck **30**, except that it is suspended from the upper side beam member **20'** instead of a lower member **24**. Prime suffixes have been applied to corresponding parts of the truck **30'** in FIGURE 3.

It will thus be apparent that the gantry car C can be driven longitudinally along the track members **15** and **15'**, to not only align it with an upwardly-positioned furnace vessel at a pouring station and receive molten metal therefrom, but can also be driven to a general pouring station or area into a cooperating relation with a line of ingot molds B.

As shown particularly in FIGURES 1 to 4, inclusive, the upper frame of the gantry car C is provided with a transversely spaced-apart upwardly-projecting pair of

stands or mounts **60** on each end beam member **21** of the upper frame that are secured thereto and project upwardly therefrom to position a pair of opposed end support assemblies for the teeming ladle E. A transversely-extending and horizontally-positioned, lower, support bar member **61** is vertically-slidably positioned at its opposite ends within vertical retaining slotted or guide portions **60***a* (see FIGURE 4) in each pair of end mounts **60** for vertical adjustment and movement with respect thereto. As shown particularly in FIGURE 4 of the drawings, each lower support bar **61** has an upwardly-open grooved or retention slotted portion **61***a* extending therealong to receive bearing assemblies **68** of any suitable conventional construction.

The ladle E has, at each of its opposed ends or sides, a pair of outwardly-projecting support or positioning arms **66** which, at their inner ends, are secured to the metal shell of the ladle E and to an intermediate reinforcing ring **67** extending thereabout. An upper slide bar member **65** of shorter extent than the spacing between the mounts **60** is endwise-slidably positioned on the lower vertical-movable bar member **61**. The slide bar member **65** has a downwardly-open grooved or retention slotted portion **65***a* to cooperatively-receive the bearing assemblies **68** in cooperation with the portion **61***a* of the member **61**. Each upper bar member **65** is adapted to move horizontally or transversely between the stands or mounts **60**, as actuated through lug or connecting arm portion **65***b* that extends through a slotted portion **61***b* of the lower member **61** and is bifurcated at its lower end. The lower end of the arm portion **65***b* has a pivot mounting on a head portion **63***b* that is carried by a piston rod **63***a* of a reversible fluid motor **63**. The motor **63**, at its one end, is secured to and projects from an end mount **62** that is secured to an underside of the lower bar member **61**. It will be noted that the slotted portion **61***b* has a sufficient length to permit a full extent of slide movement of the slide member **65** between the mounts **60**. It will thus be apparent that actuation of the fluid motor **63** will cause the pair of spaced-apart upper bar members **65** and the ladle E carried thereon to move transversely with respect to the lower bar member **61**.

Each lower bar member **61** is resiliently-positioned in a vertical direction on bumper ends or heads **70***a* of a pair of fluid shock absorbed motors **70**. The pair of fluid motors at each end of the gantry car C are mounted on end beam members **21** to project upwardly therefrom and resiliently support the vertical positioning of the lower bar support member **61** on a fluid cushion to thus provide a shock-absorbing action when, for example, the ladle E is lowered into position by a plant crane on the gantry car C or molten metal is being poured into it from a furance vessel. The fluid motors **70** may also be actuated to adjust the vertical positioning of each support assembly and thus, of the ladle E. The amount of fluid pressure applied to the lower end of the piston of each fluid motor **70** may be adjusted to provide a desired shock-absorbing action with reference to the ladle E. The movement induced by the pair of fluid motors **63** which, like the motors **70**, may be connected in parallel for simultaneous operation, enables the nozzle **71** of the ladle E to be accurately aligned with an ingot mold B and to be varied as to its alignment, as desired, during the delivery of pouring of metal from the ladle into an ingot mold B.

The mounted positioning of the support arms **66** on the metal shell of the ladle E, as particularly shown in FIGURE 3, is reinforced by their under-abutting position with respect to the intermediate reinforcing flange **67** thereof. An upper flange **67***a* serves the same function for a mount **67***b* (see also FIGURE 8) which carries a stopper assembly F. As shown, the stopper assembly F may be of conventional construction, having an inwardly-operating plug or stopper **73** that extends downwardly within the ladle E for movement into and out of engagement with a concave upper end portion of the pouring nozzle **71**. The stopper **73** is moved vertically into and out of a flow closing-off relation with respect to the nozzle **71** by means of a slide assembly carried by the mount **67***b* and actuated by a reversible fluid motor **72**.

Referring particularly to FIGURES 3, 9 and 10, an emergency or auxiliary closure for the pouring nozzle **71** has been illustrated. This closure has a stopper arm **80** which, at its extending end, carries a ceramic stopper block **81** having a cavity **81***a* therein for receiving the nozzle **71** to cooperate with and close-off its outer convex end portion. The closing-off operation is accomplished by sliding or moving the arm **80** vertically-upwardly on a pivot pin **78** that is carried by a pair of spaced apart mounts **75***a*. The mounts **75***a*, as shown particularly in FIGURE 10, extend from a short length vertical extension beam **75** that projects from the side frame member **20'** between its front truck and back driven truck **30'** on one side gantry car C. A shelf bracket **79** projects from the beam member **75** and carries a reversible fluid motor **85** thereon whose pusher head **85***a* is adapted to engage the underside of the arm **80** and move it vertically on the pivot pin **78** into and out of a closing-off position with respect to the nozzle **71**.

The arm **80**, as shown particularly in FIGURE 9, is adapted to be swung horizontally into and out of vertical alignment with the nozzle **71** on the pin **78**, as limited by a back stop **77** also secured on the beam member **75**. A second reversible fluid motor **86** is, at its back end, pivotally-secured on a bifurcated mount **76***a* and its piston rod **87**, at its forward end, is pivotally-secured within a bifurcated mount **80***a* carried by the arm **80**. The back mount **76***a* is secured on the extension member **76** of the beam **75**. It will thus be apparent that the motor **86** enables the auxiliary stopper to be swung into a vertically-aligned and out to a noninterfering position with the nozzle **71**, as indicated by the dot and dash line and the solid line positions of FIGURE 9. When the arm **80** is in its vertically-aligned position with the nozzle **71**, its box **81** may be moved upwardly to engage, receive and close-off the outer end of the nozzle or spout **71**.

FIGURE 3 shows another embodiment of a gantry car C' which has full length legs on both of its sides and whose drive truck units **30** are adapted to ride on rails **15** and **15'** that are positioned along the plant floor. In FIGURE 12, I have shown a cantilever construction of the gantry car C'', similar to that of FIGURE 3, but its driven wheeled trucks **93** and **94** are actuated by a common reversible electric motor **90** carried on a platform **92** that is suspended from back end frame member **21**. As shown, the motor **90** has oppositely-extending drive shafts which actuate gear reduction units **91** and **91'** that are connected through coupling, shaft members and meshing gears, to drive a shaft corresponding to the shaft **41** of FIGURE 7 that is coupled to a driven axle shaft **33'**.

It will be apparent from a study of FIGURES 1 and 2, that a system such as shown will enable an improved cooperative operating functioning of a teeming ladle E with respect to a group or series of ingot molds B. It will also be apparent in view of the description and showing of FIGURE 3 that the ladle E can be adjusted in height by actuating the fluid shock absorbing motors **70** to suit different sizes or heights of ingot molds B, and that the ladle E can be horizontally-transversely moved on bearing assemblies **68** to best suit the pouring of the steel into the ingot molds B. Further, in the event of a failure or the malfunctioning of the stopper assembly F, auxiliary means is provided as illustrated in FIGURES 3, 9 and 10 to close-off the ladle E to prevent damage to the equipment and wastage of the refined molten metal. As shown in FIGURE 1, the teeming ladle E has side trunnions **13** that may be engaged by hooks of an

overhead crane or hoist for moving it into and out of position on the gantry car C, C' or C''.

In the gantry car apparatus illustrated, the gantry car is mounted on wheeled trucks, one end truck **30** or **30'** of each side pair has a pair of its flanged wheels driven by motor means carried by the car for moving it longitudinally along or with respect to the plant floor **10**, for example, between a furnace vessel pouring station and an ingot mold pouring or filling station. The gantry car is adapted to move in an endwise-straddling relation with respect to a longitudinal line of upright ingot molds; in this connection it has a pair of transversely spaced-apart side frames that are provided with parts that carry the wheeled trucks. In the construction of FIGURES 3 and 12, such a part is of minor vertical extent along one side and the stationary frame part D along such side completes its side frame. Thus the side frames of the construction of FIGURES 11 as well as the construction of FIGURES 3 and 12 defines an endwise-open straddle area with the overhead support frame that is connected to the parts carrying the wheeled trucks.

Although specific embodiments of the invention have been illustrated, it will be apparent that various changes and modifications may be made with respect to the apparatus shown and that principles of the invention may be applied in other ways fully in accordance with its teachings without departing from its spirit and scope.

I claim:

1. A system for handling refined molten metal on a plant floor or the like which comprises, a first longitudinal trackway along the floor, a series of ingot cars on said trackway for carrying ingot molds in an upright position therealong, a second longitudinal trackway extending along the floor in a transversely-outwardly spaced relation with respect to said first trackway, a gantry car having a frame constructed for movement along said second trackway in an overhead straddling relationship with respect to said first trackway and the ingot cars and ingot molds thereon, a ladle carried on said gantry car in an overhead upright position thereon and having a bottom pouring spout for molten metal therein, means for moving said gantry car along said second trackway from a molten metal receiving station to an ingot mold filling station, means for supporting said ladle and aligning the pour spout thereof with a succession of the ingot molds that are advanced along said first trackway on said ingot cars; said supporting and aligning means comprising, opposed side pairs of cooperating movable bars on said gantry car, means on said gantry car to engage each of said pairs for supporting said ladle in an overhead position thereon, and means cooperating with one bar of each of said pairs for raising and lowering and cooperating with the other bar of each of said pairs for moving said ladle horizontally on the gantry car and with respect to ingot molds carried by said ingot cars.

2. A system as defined in claim **1** wherein, a side platform is positioned on the floor and extends along said first trackway in a transversely outwardly-spaced relation with respect thereto, said second trackway has one rail positioned on said platform and has a second rail on the floor in a transversely-outwardly spaced relation with respect to said first trackway; and said gantry car has an inverted L-shaped frame, one side of which has a major vertical extent to cooperate with said second rail and the other side of which has a minor vertical extent to cooperate with said first rail.

3. A system as defined in claim **1** wherein, said gantry car has opposed vertical side frames, wheeled trucks are mounted on said side frames for movement along said second trackway, and reversible motor means is carried by said side frames and operatively-connected to the wheels of said trucks to actuate them for movement along said second trackway.

4. In a system as defined in claim **1**, said means for raising and lowering said ladle is a pair of fluid motors on said gantry car along opposed sides of said ladle.

5. A system as defined in claim **1** wherein, an overhead frame connects said side frames, a drive motor is operatively-positioned on said overhead frame and has driving connections for actuating the wheels on both of said side frames.

6. In a gantry car apparatus mounted for longitudinal movement on wheeled trucks in an endwise-straddling relation with respect to a longitudinal line of upright ingot molds to carry a molten metal receiving ladle having a bottom pouring spout in an upright position thereon, a pair of transversely spaced-apart side frames having parts carrying the wheeled trucks and connected by an overhead support frame, said pair of side frames defining an endwise-open straddle area with said support frame, said support frame defining a vertically-open area therein for receiving the ladle, support arms projecting from opposite sides of the ladle, a pair of opposed support assemblies on said support frame and cooperating therewith to receive said support arms and position the ladle in an upright position on said support frame, and each of said support assemblies having a cooperating pair of upper and lower side bar members, one bar member of each pair being movable in one direction with and being movable in another direction with respect to the other bar member of the same pair for aligning the ladle on said support frame.

7. In a gantry car apparatus as defined in claim **6** wherein motor means is operatively-connected to said one bar member for actuating it.

8. In a gantry car apparatus as defined in claim **6** wherein each of said support assemblies has resilient means for cushioning the positioning of the ladle on said support frame.

9. In a gantry car apparatus as defined in claim **6** wherein each of said support assemblies comprises, a pair of transversely spaced-apart mounts secured to and projecting upwardly from said support frame, said lower bar member being positioned for up and down movement between said pair of mounts, and said upper bar member being positioned on said first bar member for transverse movement with respect thereto between said pair of mounts; said upper bar member of said pair of support assemblies being adapted to receive said support arms of the ladle.

10. In a gantry car apparatus as defined in claim **9** wherein, fluid motor means projects upwardly from said support means to engage said lower bar member, and fluid motor means is carried by said lower bar member and is operatively-connected to said upper bar member for moving said upper bar member between said pair of mounts.

11. In a gantry car apparatus mounted for longitudinal movement on wheeled trucks in an endwise-straddling relation with respect to a longitudinal line of upright ingot molds to carry a molten metal receiving ladle having a bottom pouring spout in an upright position thereon, a pair of transversely spaced-apart side frames having parts carrying the wheeled trucks and connected by an overhead support frame, said pair of side frames defining an endwise-open straddle area with said support frame, said support frame defining a vertically-open area therein for receiving the ladle, support arms projecting from opposite sides of the ladle, a pair of opposed support assemblies on said support frame and cooperating therewith to receive said support arms and position the ladle in an upright position on said support frame, each of said support assemblies having horizontally-movable means for aligning the ladle on said support frame; each of said support assemblies comprising a pair of transversely spaced-apart mounts secured on and projecting upwardly from opposite ends of said support frame, a vertically-movable bar member guidably-carried for vertical movement between said pair of mounts, fluid motor means positioned on said side frame and projecting upwardly therefrom to engage

an under side of said vertically-movable bar member to resiliently hold it in a selected vertical position with respect thereto and, upon actuation, to adjust the vertical positioning thereof between said pair of mounts, a slotted portion through said vertical bar member, said horizontally-movable means being an upper slide bar member of shorter endwise extent than the transverse spacing between said pair of mounts, bearing means positioned between an upper face of said vertically-movable bar member and a lower face of said slide bar member positioning said slide bar member for horizontal movement with respect to and on said vertical bar member between said pair of mounts, an arm projecting downwardly from said slide bar member through the slotted portion in said vertically-movable bar member, and fluid motor means secured to the under side of said vertically-movable bar member and operatively-connected to said arm for actuating said slide bar member for horizontal movement between said pair of mounts; said slide bar members having upper sides to removably-receive said support arms of the ladle thereon.

12. In a gantry car apparatus as defined in claim **6** wherein, a motor drive means is carried in an overhead position by said support frame, and operating connections extend from said motor drive means along said parts of said side frames and are connected to actuate wheels of the wheeled trucks carried by said parts.

13. In a gantry car apparatus as defined in claim **6** for operation on a plant floor wherein, said part of one of said side frames is of major vertical extent and said part of the other of said side frames is of minor vertical extent, the other of said side frames has a stationary frame part positioned on the plant floor to extend therealong, a track rail is positioned on said stationary frame part for receiving wheels of the wheeled trucks carried by said part of minor extent, and a track rail is positioned on the plant floor for receiving wheels of said part of major vertical extent.

14. In a gantry car apparatus as defined in claim **6** wherein, an auxiliary stopper means is operatively-carried by one of said side frames and has a stopper arm projecting horizontally-inwardly beneath said support frame towards the bottom pouring spout of the ladle, and operating means is carried by said one side frame for swinging said stopper arm into and out of a vertically-aligned relation with the pouring spout and for raising it into and out of closing-off engagement with the pouring spout.

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