



March 31, 1931.

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FOUNDRY AND CASTING PLANT

Filed May 5, 1928

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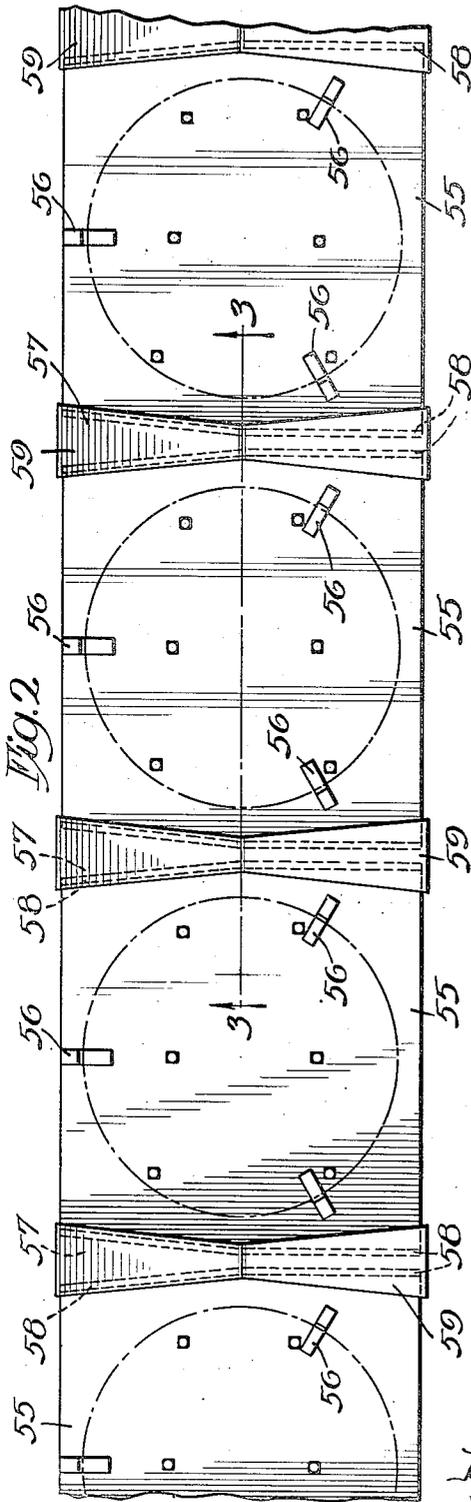
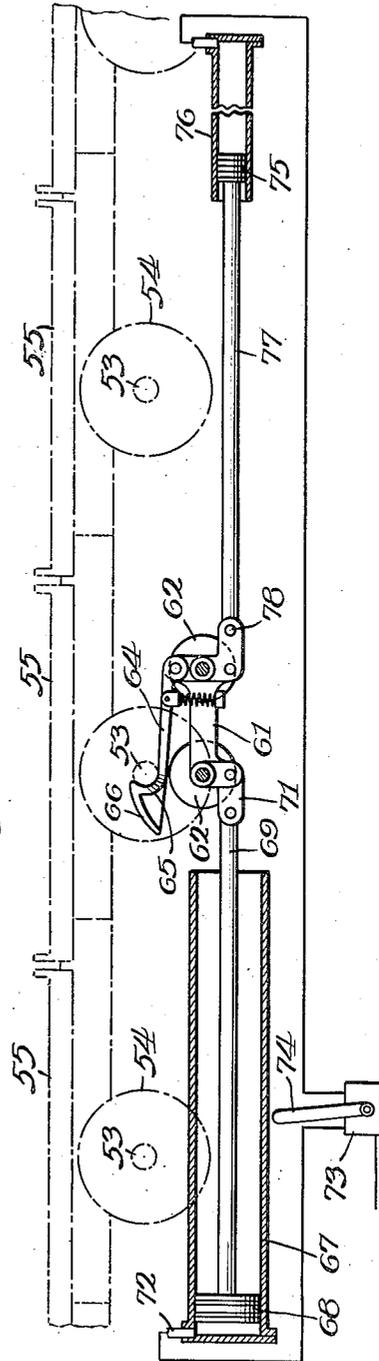


Fig. 7



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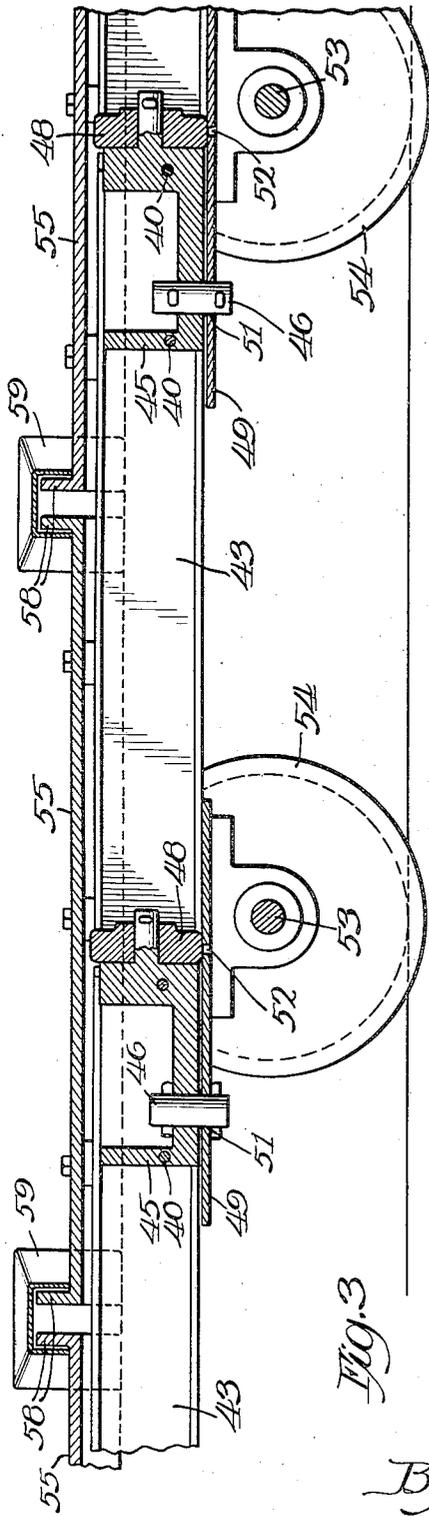


Fig. 3

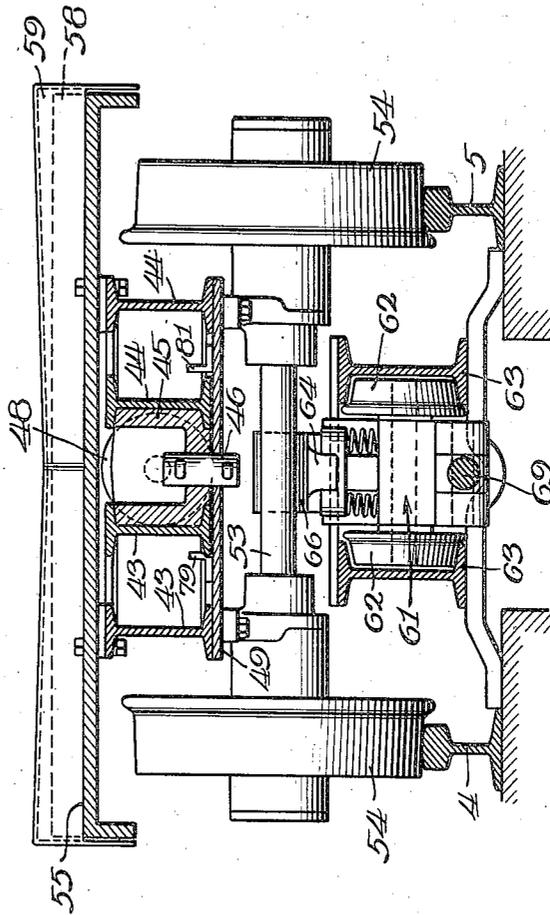


Fig. 4

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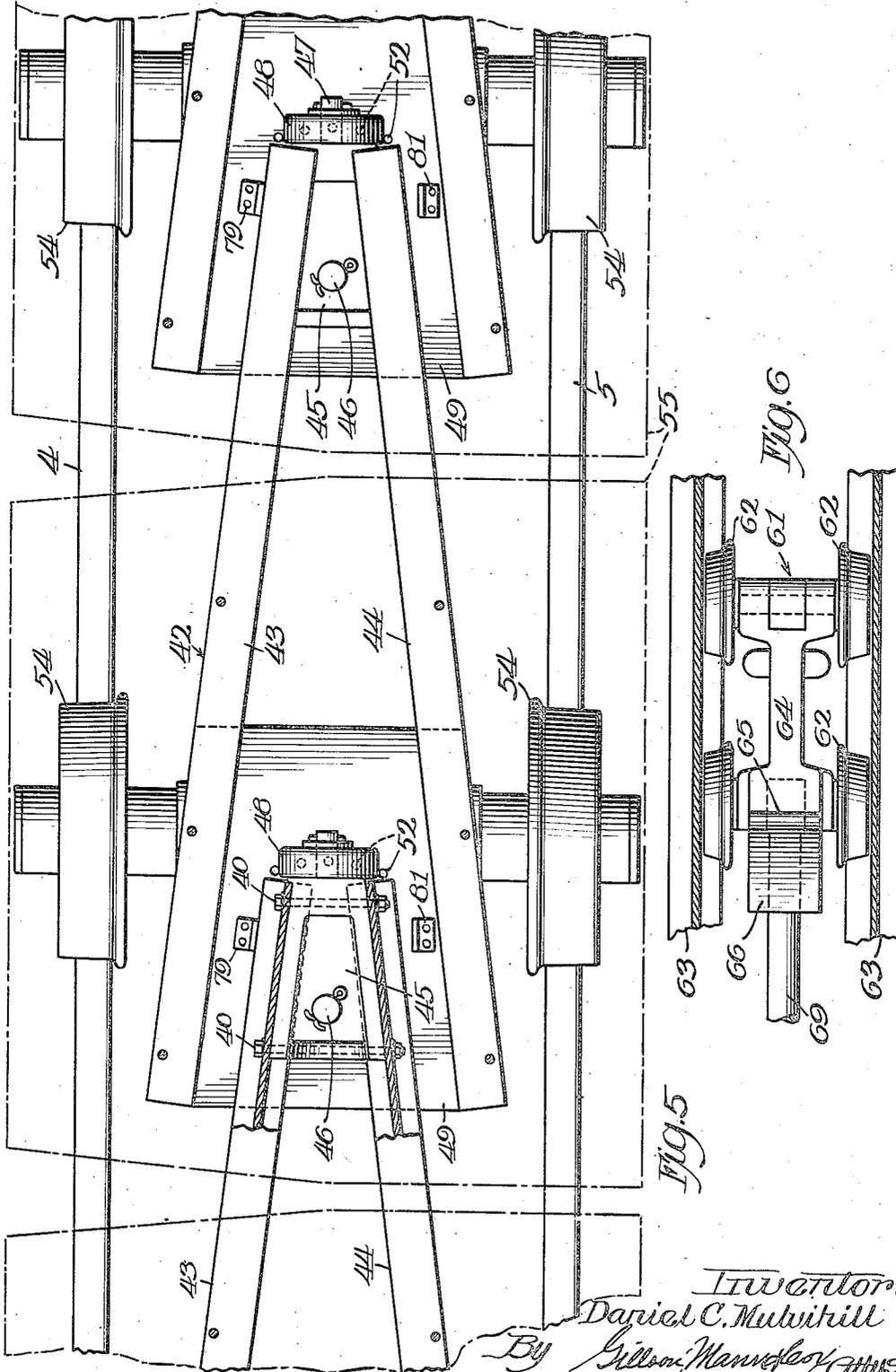
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4 Sheets-Sheet 4



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# UNITED STATES PATENT OFFICE

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## FOUNDRY AND CASTING PLANT

Application filed May 5, 1928. Serial No. 275,422.

This invention relates to improvements in moulding or casting plants that is designed to be continuously operated, with a minimum expenditure of labor and energy.

5 Another object of the invention is the provision of a moulding or casting plant that is provided with new and improved means for performing the various steps in the casting operation.

10 A further object of the invention is the provision of a new and improved endless conveyor for conveying the moulds or flasks from the moulding machines past the different stations in the moulding and casting operations.

15 Another object of the invention is the provision of a new and improved moulding or casting plant that is comparatively simple in construction, easily installed, economical and efficient in operation and that is admirably adapted for quantity production.

20 Other and further objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings in which

25 Fig. 1 is a diagrammatic view in plan of the moulding plant;

Fig. 2 is a plan view of a portion of the endless carrier;

30 Fig. 3 is a longitudinal section thereof along the line 3—3 of Fig. 2;

Fig. 4 is a vertical transverse section of the endless carrier and track taken through the advancing mechanism;

35 Fig. 5 is a top plan view of a portion of the endless track with the tops or platform of the truck shown in dotted lines;

Fig. 6 is a plan view of a portion of the advancing mechanism showing parts in section;

40 Fig. 7 is a side elevation of a portion of the advancing mechanism shown more or less diagrammatically and with a portion of the endless carrier shown in dotted lines;

45 Fig. 8 is a perspective view of one end of the inclined track member 32;

Fig. 9 is a perspective view of one of the skids;

50 Fig. 10 is a diagrammatic view of the inclined trucks; and

Fig. 11 is a perspective view of a portion of one end of the inclined track 30.

It is common practice in casting car wheels and the like to form the moulds on the floor of the foundry beneath traveling cranes that 55 are adapted to convey the molten metal from the cupola to the flasks and remove the cast wheels from the flask and convey them to the cooling pits. This is a slow and laborious method and requires considerable floor space. 60 The present invention provides means for simplifying the work and reducing the labor and expense of the operation as well as economizing floor space.

It has been proposed to employ an endless 65 carrier for conveying the moulds from the moulding machine past the station where the molten metal is poured into the moulds and when the cast article is removed to remove the copes, chills and drags, and re- 70 turn them on another conveyor to the moulding machines. This arrangement is objectionable because it is necessary to employ additional conveyors for returning these parts. The present invention con- 75 templates utilizing the main endless carrier for returning the drags to the mould thus eliminating the necessity of carriers for returning the drags, thereby effecting considerable saving in floor space which is quite 80 an item in moulding plants.

In Fig. 1 is shown more or less diagrammatically a moulding plant equipment according to the present invention. This equipment comprises an endless carrier 10 operat- 85 ing on tracks 4 and 5 arranged preferably somewhat in the form of an ellipse with parallel sides 6 and 7 and curved ends 8 and 9. The carrier 10 is made up of a plurality of trucks 11 for conveying the moulding flasks and portions of the same past the different stations as will presently appear. A cupola 12, mixing ladle 13, pouring ladles 14, mounted on the ladle truck 15, movable along the tracks 16 are located adjacent to one side 90 of the track and constitute what may be termed the pouring station. The sand pit 17 for receiving the sand from the flask, the cooling pits 18 and the cranes 19, 21 and 22 for removing the cast article and for manip- 100

ulating the parts of the flask are mounted at one end of the elliptical track and may be termed the discharging station.

The drag and cope moulding machines 23, 24 and 25, 26 together with suitable overhead cranes 27, 28, 29 and 31 are located on the other side of the elliptical track and may be termed the moulding station. A plurality of pairs of inclined tracks 32, 33 for conveying the cope and chill ring from the discharge station to a position adjacent to the moulding machines, together with a return track 34 for the skids are located within the endless carrier 10 as clearly shown in Fig. 1 of the drawings.

In the casting operation, the carrier 10 is moved intermittently in the direction indicated by the arrows shown at the left in Fig. 1. Each truck 11 carries one moulding flask. After the trucks have passed the cope moulding machines 25 and 26, and the copes and chill ring 40 have been placed on the drags 30, they are conveyed by an intermittent movement around to the side 7 where the molten metal is poured into the flasks from one of the ladles 14. If the article to be cast is of considerable size, as for instance the larger wheels of a railway truck, the truck 15 carrying the ladles is moved to the left end of the track 16 and pours into the flask from that position in order to give the article a longer time to cool before it reaches the station where it is to be removed. If, on the other hand, the article is comparatively small, as for instance the smaller wheels of a railway carriage, the truck 15 may be moved toward the right end of the track 16 and the metal poured into the flasks from that position.

When the truck containing the filled flask reaches the curved portion 9 of the track, the cope and chill 40 together with the article are removed by a suitable crane 22 and the sand is shaken out through the grates 20 into the sand pits 17, leaving the article on the grates, after which the cope and chill 40 are placed on inclined tracks 32 and 33 by said crane or an overhead carrier 60. In actual practice, the carrier 60 is not required as the boom of the crane 22 is of sufficient length. The cast wheel is then conveyed by crane 21 to the overhead carrier 34 which deposits it in the cooling pits 18.

When the trucks have been advanced to the crane 19, the drag is removed, the sand shaken out into the pit 17 and the drag replaced on the truck from which it was removed. When the trucks containing the drags reach the drag moulding machines 23 or 24, they are removed for the moulding operation, after which they are returned to the same trucks from which they were removed. The copes are stacked four deep on skids 85 on a short horizontal portion 36 of the tracks 32 and 33 at the upper ends thereof. After

they have been stacked four deep, the stack is given a slight push and they are moved down the tracks 32 and 33 by gravity to the lower end of the tracks where they are removed by overhead cranes 27 and 28 to the moulding machines 25 or 26. After the moulding operation, the copes are replaced on the drags and the flask completed, thus completing one cycle of the operation.

The tracks 32 and 33 for returning the copes and chills to the moulding machine 25 and 26 by gravity may be of any suitable construction. As shown in Fig. 8, each track may comprise a pair of angle bars 82 and 83 between which are rotatably mounted the antifriction rollers 84 on which the skids 85, see Fig. 9, are adapted to ride. As shown more or less diagrammatically in Fig. 10, each of the tracks is provided at its upper end with a substantially horizontal portion 36 on which the skids 85 may rest without any tendency to slide down the incline. The tracks 32 are arranged in pairs and each tier of copes is supported on two of the skids 85 on a pair of the tracks 32. The skids are returned by gravity on the inclined track 30 having the anti-friction rollers 70 therein. See Figs. 10 and 11.

The tracks 30, 32 and 33 are all mounted within the space defined by the endless track 4 and 5, thereby conserving floor space within the foundry.

Suitable conveyors 41 are provided for transferring the sand from the pit 17 to the moulding machines 23, 24, 25 and 26. The sand is preferably properly treated after each casting operation and may be used over and over again.

The endless carrier comprises a plurality of trucks 11, the construction of each of which will now be described. Each truck comprises a triangular shaped frame 42 having the side members 43 and 44 converging forwardly. The members 43 and 44 may be I-beams and are connected at their front portion by an attaching block 45 held between the flanges of the side bars 43 and 44 in any suitable manner, as by bolts or rivets 400, see Fig. 5.

The block 45 is provided with a vertical opening for receiving pivot pin 46 carried by the rear portion of the front adjacent truck. The front end of the block 45 is provided with a journal 47 on which may be mounted anti-friction roller 48. The rear ends of the side bars 43 and 44 are connected together by a plate 49 having an opening 51 which is adapted to align with the opening in the block 45 for receiving the pivot pin 46 (see Fig. 3). The plate 49 is preferably provided with a series of openings 52 arranged in the arc of a circle beneath the anti-friction roller 48 for permitting dirt and the like to escape from beneath the said roller, see Fig. 5. The frame 42 is supported at its rear end by an

axle 53 in advance of the pivot 46 whereby any tendency of the truck to advance alternately one wheel at a time will be resisted. The axle is provided with flanged wheels 54 for engaging the rails of the endless track 5. A platform or supporting plate 55 is mounted on the frame 42 in any suitable manner, as by being bolted to the side bars 43 and 44, see Fig. 2. A plurality of cleats or stops 56 are arranged in a circle on the top surface of the supporting plate 55 for positioning the flask when the same is placed on the truck.

In order to permit the trucks to pass around the curve, the inner edges at each end of the plate are cut away as at 57 and in order to prevent accidents to the workmen or employees in-charge of the apparatus, suitable means are provided for shielding the opening between the trucks. As shown, each of the plates 55 is provided at each end with upwardly extending flange 58, and a shield 59 U-shaped in cross section and widening at its outer ends is adapted to be placed over the flanges 58 as clearly shown in Figs. 2 and 3. Preferably the axle is so arranged that the outer wheel will be slightly in advance of the inner so that there will be no tendency for the outer wheel to ride upon the rail.

Suitable means are provided for advancing the endless carrier intermittently. Any suitable means may be employed for this purpose. In the form of the device disclosed, the endless carrier is advanced the distance between two adjacent trucks at each forward movement of the propeller device. This device comprises a truck 61 having flanged wheels 62 for engaging between the flanges of a track 63 secured between the rails of the endless track 5, see Figs. 4 and 6. The truck 61 carries a spring pressed arm 64 having its free end in the form of a hook 65 for engaging the axles 53 of the trucks for advancing the same. The outer end of the arm 64 beyond the hook 65 is provided with a downwardly and rearwardly extending projection 66 which is adapted to guide the hook beneath the axle during the return movement of the truck. The truck is adapted to be advanced by a suitable steam or compressed air device.

As shown, a cylinder 67 having a piston 68 therein, the piston rod 69 of which is attached to the truck 61, as at 71, is provided, see Fig. 7. Compressed air or steam is led to the cylinder through the pipe 72 from the control 73. The control is operated by a lever 74 in the usual manner. The truck is returned by a small piston 75 operating in a cylinder 76. The piston rod 77 of the piston 75 is connected to the truck 61 as at 78. Compressed air or steam is supplied to the cylinder 76 from a suitable source of supply through the control 73. Since the mechanism for controlling the supply of steam or compressed air to the cylinders 67 and 76

may be of the usual or any well known construction, it is not thought necessary to further illustrate or describe the same. The controls for the ladle, the different cranes, and for the truck advancing mechanism, may, if desired, be located at a central point whereby a single operator may operate the same.

The endless carrier 10 is of metal and consequently the total expansion of the same is considerable while the casting plant is in operation due to the intense heat of the molten metal that is carried by flasks on the trucks 11. In order to compensate for this expansion, the width of the track is made greater than the distance between the center lines of the wheels and the length of the track is such that before the operation begins the flanges of the inner wheels will be in contact with the sides of the tread portions of the inner track and the flanges of the outer wheels will be spaced from the outer track, and when the endless carrier expands the flanges of the outer wheels will be adjacent to but not in contact with the outer rails so that there will be no tendency of the flanges on the outer wheels to ride upon the rails.

Since each truck is mounted on a single axle, it is necessary to provide means for limiting the angular movement of each truck relative to the adjacent trucks. Otherwise on moving around the curved portion of the track, the truck wheels would tend to ride upon the rails and become derailed.

As shown, a stop lug 79 is mounted on the connecting plate 49 of each truck adjacent to the side bar 43 in front of the pivot 46 for limiting the angular movement of the side bar 43 of one truck relative to the corresponding side bar of the truck following. A stop lug 81 is also provided for engaging the front end of the side bar 44 for limiting its movement in the opposite direction. The stop lug 79 on one truck is adapted to engage the side bar 43 on the following truck when the longitudinal axes of the trucks are in alignment.

It is thought from the foregoing taken in connection with the accompanying drawings that the construction and operation of my device will be apparent to those skilled in the art, and that changes in size, shape, proportion and details of construction may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. A truck for an endless carrier for a foundry, comprising an axle, a wheel on each end of said axle, a pair of forwardly converging bars, means for mounting said bars on said axle, a block between the forward ends of said bars, an antifriction roller on said block, said block having an opening for pivotally attaching said truck to an immediately

preceding truck, a platform mounted on said bars, and stops on said platform.

2. In an endless carrier for a foundry plant, an axle, a flanged wheel on each end of said axle, a pair of forwardly converging I-beams, means for securing said beams to said axle above the same, an attaching block secured between the forward ends of said beams, a vertical opening in said block for receiving a pivot, a platform on said beams, a plate attached to the lower portion of said beams at the rear end thereof.

3. In a foundry, an endless track, an endless metallic carrier thereon for conveying molding flasks, said carrier comprising a plurality of two-wheeled trucks, the wheels of said trucks being flanged, means for pivotally connecting said trucks together with the flanges of the inner wheels in proximity to the ball of the inner track when said trucks are cold, whereby when they expand by the heat of the cast articles in said molds the flanges of the inner wheels will be spaced from said inner rail and the flange of the outer wheel will be adjacent to the ball of the outer rail.

4. In a foundry, an endless track, an endless carrier on said track, said carrier comprising a plurality of two-wheeled trucks each having a frame and supporting plate thereon, means for pivotally connecting the forward end of each truck to the preceding truck rearwardly of the axle, and means for preventing the turning of said trucks beyond a straight line in one direction, and means for limiting the turning movement of said trucks in the opposite direction.

5. An endless conveyor for foundry plants comprising a plurality of two-wheeled trucks pivotally connected together, means on said trucks for supporting and retaining a moulding flask thereon, and means including stops for limiting the angular movement of one truck relative to the preceding and following trucks.

6. An endless conveyor for foundry plants, comprising a plurality of two-wheeled trucks, each having forwardly converging frame members, a pivot block between the forward ends of said members and provided with a pivot pin opening, a plate secured to the underside of said members at the rear thereof and provided with a pivot pin opening, a stop on said plate at each side of the median line of said truck for limiting the angular movement of said truck relative to the preceding truck, and a supporting plate on said members.

7. In a system for continuously casting articles, an endless track comprising a pair of rails, an endless carrier comprising a plurality of metallic trucks having flanged wheels for engaging said rails, the tread of said rails being greater than the tread of said trucks and the length of the median line of said endless track being greater than the median line

of said endless carrier when said trucks are cold whereby said trucks will remain on said tracks when the length of said endless carrier is extended by increase in temperature of the individual trucks.

8. In a foundry, an endless track and endless carrier on said track, said carrier comprising a plurality of two wheeled trucks pivotally connected together, the outer wheel of each truck being arranged slightly in advance of the inner, a plate on each truck for supporting a moulding flask, and means on each of said trucks for limiting the angular movement of the following truck.

9. In a system for molding articles comprising an endless track, an endless carrier intermittently moving upon said track, a molding station and a discharge station in spaced relation about said track, a second track parallel with said first track, a transport buggy on said track, molten metal carrying and pouring means mounted thereon and forming therewith a movable pouring station, said carrier and movable pouring station being stationary during the pouring operation, the length of said second track being sufficient to allow the placing of said movable pouring station at positions demanded by the varying masses of metal to be cast whereby the temperature of the metal on reaching said discharge station may be maintained at a substantially constant value irrespective of the mass of metal poured.

In testimony whereof I affix my signature.

DANIEL C. MULVIHILL.