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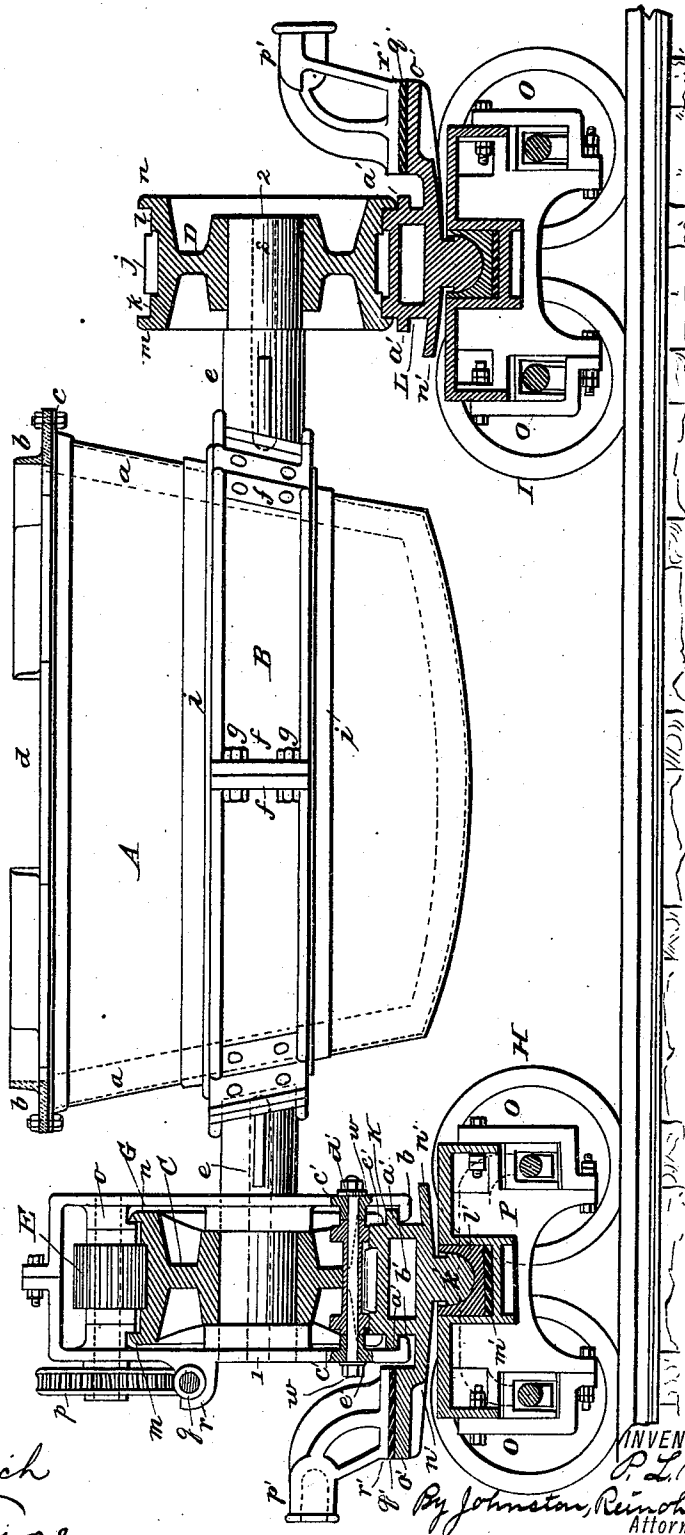
3 Sheets—Sheet 1.

P. L. WEIMER.
CINDER CAR FOR BLAST FURNACES.

No. 353,009.

Patented Nov. 23, 1886.

Fig. 1.



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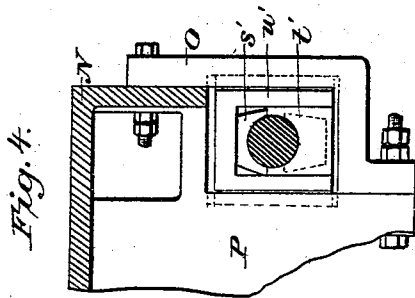
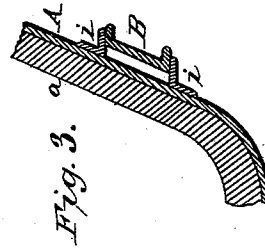
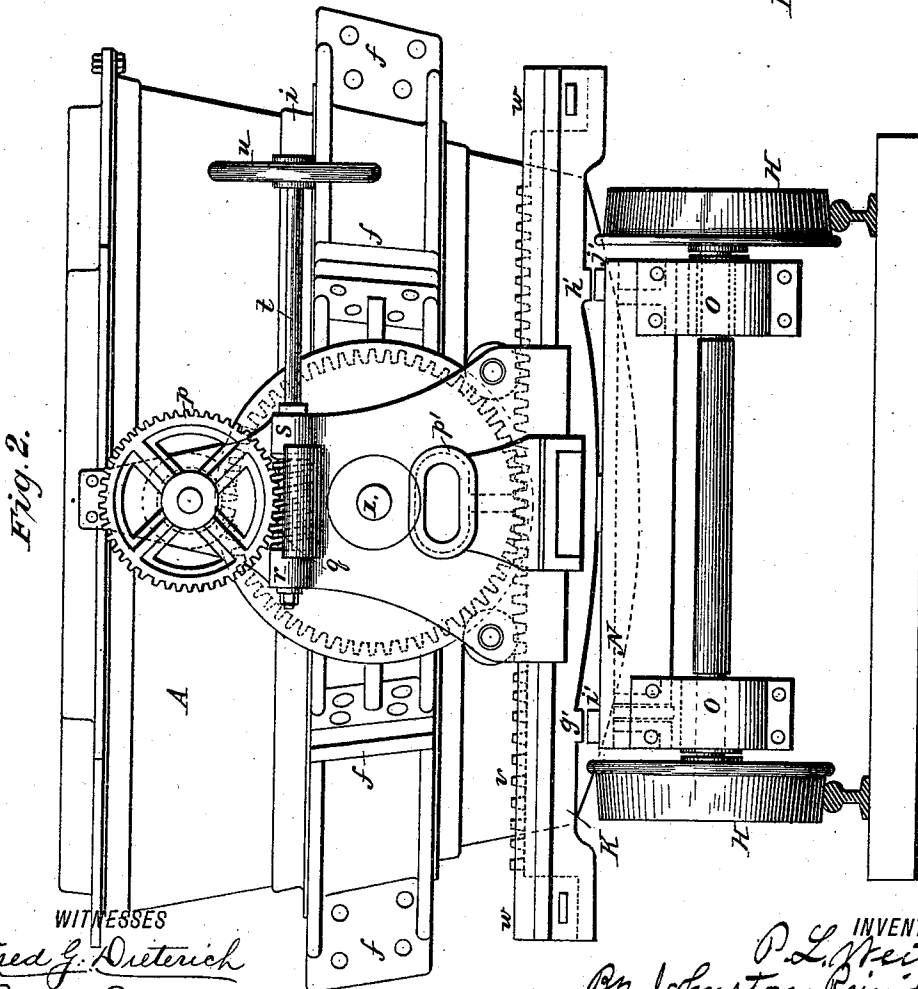
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3 Sheets—Sheet 2.

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WITNESSES

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UNITED STATES PATENT OFFICE.

PETER L. WEIMER, OF LEBANON, PENNSYLVANIA.

CINDER-CAR FOR BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 353,009, dated November 23, 1886.

Application filed July 14, 1886. Serial No. 208,146. (No model.)

To all whom it may concern:

Be it known that I, PETER L. WEIMER, a citizen of the United States, residing at Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Cinder-Cars for Blast-Furnaces; 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.

The invention relates to cinder-cars adapted to convey molten or liquid cinder from a blast-furnace to a place provided for it, and has for its object the construction of a car body or ladle which may be easily and readily turned upon its axis to pour out cinder on either side of a railroad-track as far from the rail as possible, and also revolved over a pit for the removal of chilled cinder when necessary.

Cinder-cars, as ordinarily constructed, provide for drawing off liquid cinder through an opening on the side of the car body or ladle, near the bottom thereof; but when cinder chills in the ladle it (the ladle) can only be revolved into an inverted position directly over the center of the track on which the car moves. As it would then be impossible to remove the cinder from under the car, the ladle is only partially turned over, and its contents must be dug out by breaking the mass and removing it by manual labor. It is a fact well known to furnace-men that such an operation is exceedingly laborious and expensive, and that under certain conditions of the working of a furnace the cinder is liable to chill frequently in the car, which necessitates the operation of digging out the contents of the car each time it chills.

By my invention no door on the side of car body or ladle is used for removing the cinder; but the ladle is turned on its axis and the cinder poured out some distance from the track, which is due to the ladle having lateral movement on the car-trucks supporting it. When it happens that the contents of the ladle become chilled, the ladle can be revolved laterally from off the car-trucks to a prepared place to receive such a chilled mass, and its contents dropped out of the then inverted ladle

at a comparatively small expenditure of labor and time.

The invention will be hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 represents a side elevation, partly in section; Fig. 2, an end view showing the worm-gear for tilting or revolving the car body or ladle; Fig. 3, a section showing the space between the ladle and its supporting-hoop. Fig. 4 represents an enlarged side view of the axle-box; Fig. 5, an end view of the car and a side view of the pit, with the car-body in an upright and in an inverted position; Fig. 6, an end view of one wall of the pit, and Fig. 7 a perspective of the detachable section of the toothed or geared track.

Reference being had to the drawings and the letters marked thereon, A represents the car body or ladle, provided with a lining, *a*, of fire-brick or other suitable material, held in position by a flanged plate, *b*, which is secured to angle-iron *c*, surrounding the top of the body, by suitable bolts, as shown. The vertical flange of the plate *b* is cut away at *d* to form a spout or mouth for the flowing cinder. The car-body is supported in a hoop, B, separate from the body, and made in six sections, two of which have trunnions *e* cast integral therewith. The several sections of the hoop are provided with flanges *f*, for securing them together by means of bolts *g*. By making the hoop B in sections the car-body can be placed in position in the hoop without removing the angle-irons *i*, which bear against the edges of the hoop and prevent the car-body from being displaced while being tilted or inverted, and the several joints of the hoop impart a degree of elasticity thereto, adding strength and enabling it to withstand or endure the shock incident to coupling the car to a locomotive.

It will be observed that the car body or ladle is not firmly attached to the hoop B and its trunnions, but rests upon the loop by the upper angle-iron, *i*, bearing thereon, and that quite a space intervenes between the outer surface of the wall of the car-body and the inner surface of the hoop, as shown in Fig. 3.

By making the ladle separate from the hoop

and with ample space between them, the ladle is free to expand without throwing any strain on the hoop or endangering its stability by expansion and contraction.

The trunnions *e* are cored out, as shown at 1 2, and to each is secured a master gear-wheel, C D, each of which wheels is provided on its periphery with a toothed portion, *j*, and plain surfaces *k l* on opposite sides of the teeth, and with flanges *m n*, the purpose of which will hereinafter appear. With the wheel C a pinion, E, engages, which is mounted upon a shaft, *o*, supported in plates F G, and upon the outer end of said shaft *o* is secured a worm-gear wheel, *p*, which engages with a worm, *q*, supported in brackets *r s*, formed on the plate C, and is operated by shaft *t* and hand-wheel *u*.

It has heretofore been the practice to suspend the car body or ladle of a cinder-car by means of trunnions united to the ladle, or by trunnions attached to and forming part of a hoop, into which the ladle was closely fitted and secured thereto, without any provision to allow for the expansion of the ladle, but, on the contrary, making the wall of the ladle a support to the hoop and trunnions. This has also been the practice in the construction of ladles for handling molten metal. In such constructions the worm-gear wheel was placed directly on the trunnion and the worm connected immediately with it, turning the ladle on its axis, resting in a central journal-box over a truck-support or pillow-block.

In handling large quantities of cinder or metal it has been found that the strain was so great as to strip the teeth from the worm-gear wheel, when the ladle would tilt backward or forward, according to the angle of inclination it was in, and frequently cause serious damage.

By interposing the master gear-wheel C and the pinion E between the trunnion and the worm-gear wheel *p* the weight of the car-body and its contents is distributed over the several gear-wheels and the stripping of the teeth from the wheel *p* prevented. A further advantage of this construction is that the car-body can be held at any angle of inclination until a portion of its contents has been discharged, when it may be changed to suit circumstances.

In working blast-furnaces it sometimes occurs that iron is drawn off with the cinder, and when in the car it gravitates to the bottom. By the construction and operation of my cinder-car the cinder may be poured off until the iron is reached, when the ladle may be run back or held and the car drawn to an appropriate place, where the iron may be poured off and saved without further labor.

H I represent trucks mounted upon wheels, as usual, and provided with bolsters K L, the upper surfaces of which are provided with gear or teeth *v* and tracks *w* on opposite sides of the teeth, which correspond with the teeth *j* and the plain surfaces *k l* on the wheels C D, and from each side of the bolsters project ribs *a'*, with which flanges *b'* on the plates F G engage. The surfaces of the tracks *w* are about

on the pitch-line of the teeth *v*, and the surfaces *k l* on the wheels C D sustain the same relation to the pitch-line of the teeth *j*. By this construction the weight of the car-body is borne by the tracks *w* on the bolsters K L and the surfaces *k l* of the wheels C D, thus relieving the gearing of said weight.

Between the plates F G are wheels *e'*, mounted upon shafts *d'*, secured to said plates. The wheels *e'* run on the tracks *w* and support the weight of the plates and the gearing attached thereto, and also assist in supporting the weight of the car-body and its contents. The flanges *m n* on the wheels C D engage with the outer sides, *e'*, of the tracks *w*, and, in conjunction with the gearing, form the means for coupling the two trucks through the medium of the hoop and its trunnions. The lower sides of the bolsters are provided with projections *g' h'*, which are arranged opposite to corresponding projections, *i' j'*, on the plate N of the trucks, and prevent the tilting of the bolster to any considerable extent when the car-body is run out on either side of the trucks.

To provide for the swinging of the car in adapting itself to any curves in the roadway, the bolsters are provided with hemispherical projections *k'*, which are seated in corresponding boxes, *l'*, supported by the plate N in a recess in the truck-frame P. Each box *l'* is seated upon an elastic cushion, *m'*, which relieves the car containing liquid cinder of any jolts caused by rough places in the road or matter that may have fallen on the track, and prevents the spilling of its contents. The bolsters are also provided with flanges *n'*, curved on their lower surfaces, to prevent any undue rocking of the car. To an extension, *o'*, of the flanges *n'* are secured coupling jaws or heads *p'*, with an elastic cushion, *q'*, interposed between the flange *r'* of the coupling-jaw and the flange of the bolster. By the interposition of the cushion *q'* the shock due to the locomotive striking either of the jaws *p'* in the act of coupling is taken up by the cushion and undue strain prevented.

O represents laterally-removable covers for the axle-boxes, which are secured at their upper ends to the plates N by bolts and to the truck-frames P at their lower ends, as shown. The journal-boxes *s' t'* are held in a rectangular frame, *w'*, open at both ends and at its lower side.

As car-axle boxes are generally constructed the truck must be jacked up sufficiently high to permit the raising of the axle out of the boxes. In the manipulation of so heavy a structure as my cinder-car it becomes necessary to provide a construction that will obviate this necessity.

By the use of the axle-box shown and described the trucks need not be raised any higher than merely to take the weight of the car off the axles, when the cover O may be removed and the axles run out on either or both ends of the trucks, they carrying with them the rectangular frames *w'*, containing the journal-

boxes *s' t'*. The worn boxes are removed, new ones applied, and the axles returned to their places, when the covers O are replaced and the car is again ready for use.

5 The car constructed as described is operated as follows: After having been filled with cinder the car is drawn out of the furnace by a locomotive and taken to a suitable place for dumping, when the car body or ladle is turned to either side
10 of the trucks, which act causes the car-body to travel laterally on the bolsters while it is being tilted, and will cause the contents of the car to be discharged so far away from the track as to avoid any obstruction therefrom or danger of
15 burning the sills on which the track is laid. Should the furnace be discharging iron with the cinder, the latter is poured off until the iron which has gravitated to the bottom of the ladle has been reached, when the car is moved
20 to a suitable place and the iron poured out. When, from an abnormal condition of the furnace, it is working or discharging "mucky cinder"—i. e., cinder that is very stiff and will chill rapidly in the ladle—it cannot be
25 discharged from the ladle through a door in the side, for the reason that it chills on the surface of the lining and over the aperture controlled by the door, and forms "scull" sufficiently hard to prevent the discharge of
30 the contents of the ladle when the door has been opened. This cinder will, however, pour over the top of the ladle before it becomes too thick to run, after which it must be removed by other means. To overcome this difficulty I
35 provide pits, over which the ladle is revolved and its contents dumped or discharged. In constructing these pits two will be sufficient, and they may be placed in any convenient position.

40 In Fig. 4, A' represents one of the side walls of a pit, surmounted by a track, B', which corresponds with the upper surface of one of the bolsters on the car, and the opposite wall (not shown) is provided with another track. The
45 inner ends of the tracks B' are provided with recesses 3, and both ends of the bolsters with corresponding recesses, 4, into which recesses a detachable section, C', of track is laid and secured to the bolsters and the track by keys
50 5, and thereby forms a continuous track.

A car containing mucky cinder is run out of the furnace and its contents poured out of the ladle, if it has not become too thick to run. In the latter event the car is drawn
55 to one of the pits, the connecting-section C' inserted, and the car body or ladle run out by the worm-gear over the pit until it has made one revolution. The flanged plate-sections b' are then removed from the top of the ladle,
60 and the ladle again revolved until it assumes an inverted position, as shown at D', when the lining of the ladle, together with the mass of chilled cinder, will fall into the pit. The ladle is then revolved back again until it assumes
65 an upright position, such as is shown at E', when it is relined preparatory to subsequent use.

The object in revolving the ladle before dumping its contents is to get it a considerable distance away from the track, to avoid any
70 obstruction from the cinder or bricks as they fall from the ladle. The two views D' E' do not show the relative positions of the ladles in practice, but are given merely to explain the operation of my invention.

75 In practicing my invention, instead of waiting for the car body or ladle which has just been discharged until a new lining has been inserted, a ladle already lined may be run upon the trucks from the other pit-walls by
80 simply detaching the section C' and moving the trucks into proper position with the tracks on the pit-walls supporting the lined ladle.

Having thus fully described my invention, what I claim is—

85 1. A cinder-car body supported by a hoop constructed in sections and detached from the body, substantially as described.

2. A cinder-car body supported by a hoop having trunnions formed thereon and pro-
90 vided with gear-wheels, in combination with a geared track and means for revolving the car-body and moving it laterally, substantially as described.

3. A cinder-car body supported upon trun-
95 nions having master gear-wheels secured thereto, in combination with car-trucks having bolsters provided with geared or toothed surfaces, and suitable gear for revolving the car-body and moving it laterally, substantially
100 as described.

4. A cinder-car body supported upon trunnions having wheels secured thereto provided with gear-teeth and plain surfaces adjacent
105 thereto, in combination with bolsters having their upper surfaces provided with teeth, and tracks adjacent thereto, substantially as described.

5. A cinder-car body mounted upon trunnions provided with wheels, in combination
110 with bolsters having tracks formed thereon, and laterally-projecting flanges, flanged plates engaging with said flanges, and suitable gear for revolving the car-body, substantially as described.

115 6. A cinder-car body mounted upon trunnions provided with gear-wheels, a geared pinion engaging with one of said gear-wheels, a worm-gear wheel, and a worm, all combined substantially as described.

120 7. A cinder-car body mounted upon trunnions provided with gear-wheels, a frame-incasing one of said wheels on opposite sides, and a bolster provided with a track, in combination with supplemental wheels supported
125 by said frame and adapted to engage with the track on the bolster, substantially as described.

8. A cinder-car truck having a bolster provided with a projection on its lower side, in combination with a seat for said projection
130 and an elastic cushion under said seat, substantially as described.

9. A cinder-car truck having a bolster provided with a projecting flange, in combination

with a coupling jaw or head and an elastic cushion interposed between the flange of the head and the flange on the bolster, substantially as described.

5 10. A cinder-car truck having a bolster provided with a track on its upper surface and projections on opposite sides of its longitudinal center, in combination with a plate on the truck-frame having corresponding projections,
10 substantially as described.

11. A cinder-car truck having a frame provided with axle-boxes, and covers laterally removable on a horizontal plane, substantially as described.

15 12. A cinder-car truck having a frame provided with laterally-removable axle-box covers on the end of said frame, in combination with an open frame containing axle-boxes, and laterally removable from said truck-frame,
20 substantially as described.

25 13. A revoluble cinder-car body mounted on trucks having tracks thereon, in combination with a pit and means for dumping said car-body over said pit, substantially as described.

14. A revoluble cinder-car body mounted

on trucks having bolsters with tracks formed thereon, in combination with a pit having tracks surmounting its walls, and detachable sections of track for connecting the bolsters
30 with said tracks, substantially as described.

15. A revoluble cinder-car body having a horizontally-projecting flange at its upper end, in combination with a removable lining and flanged plates projecting over said lining
35 and detachably secured to said horizontal flange on the car-body, substantially as described.

16. A cinder car body supported on gear-wheels having projecting flanges thereon, in
40 combination with trucks having bolsters provided with gear, and projecting tracks adjacent thereto, with which the gear and flanges on the supporting-wheels engage, substantially
45 as described.

In testimony whereof I affix my signature in presence of two witnesses.

PETER L. WEIMER.

Witnesses:

W. J. TAYLOR,

SELIM S. THOMAS.