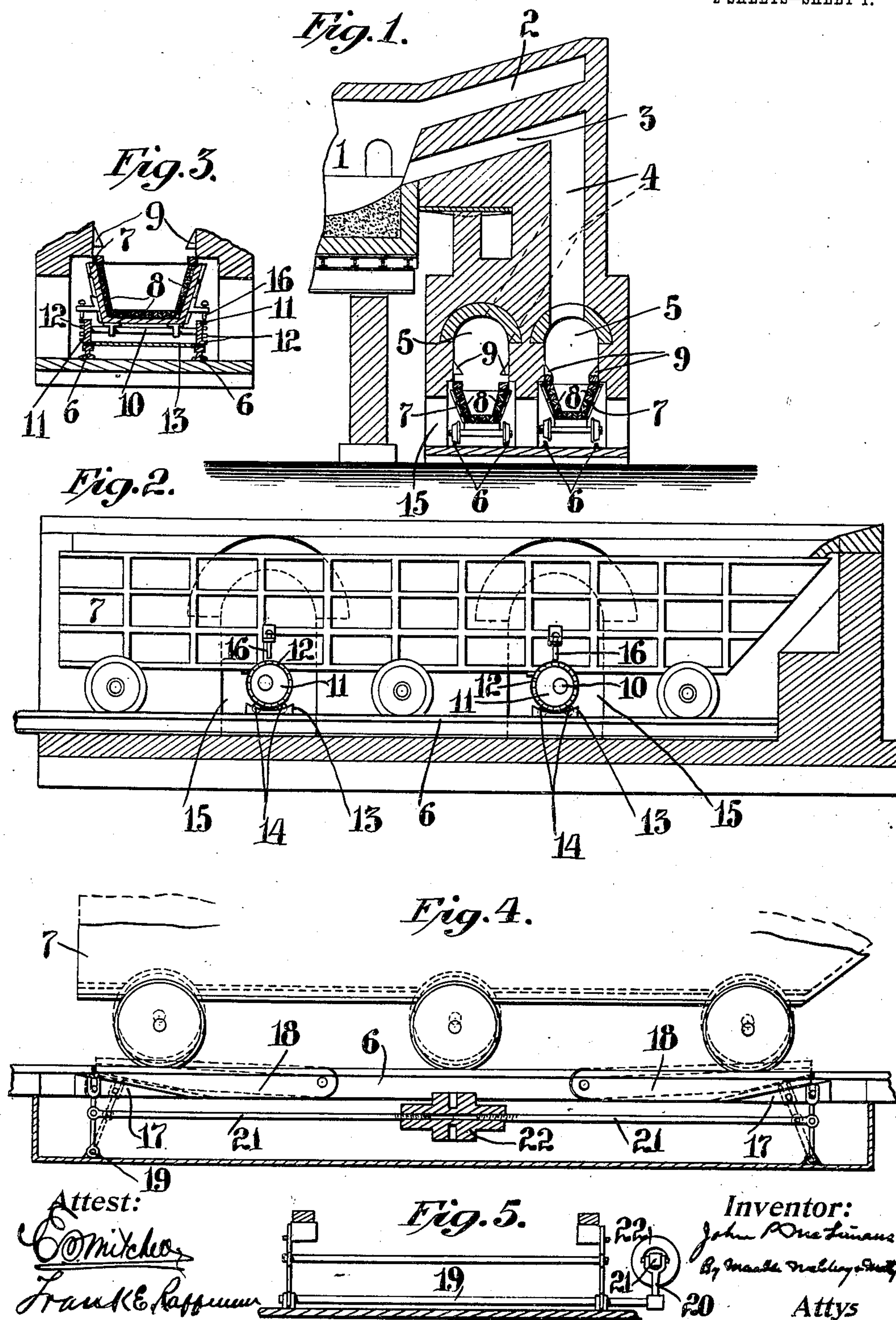


J. P. MoLIMANS.
FURNACE.
APPLICATION FILED JAN. 29, 1908.

908,311.

Patented Dec. 29, 1908.

2 SHEETS—SHEET 1.

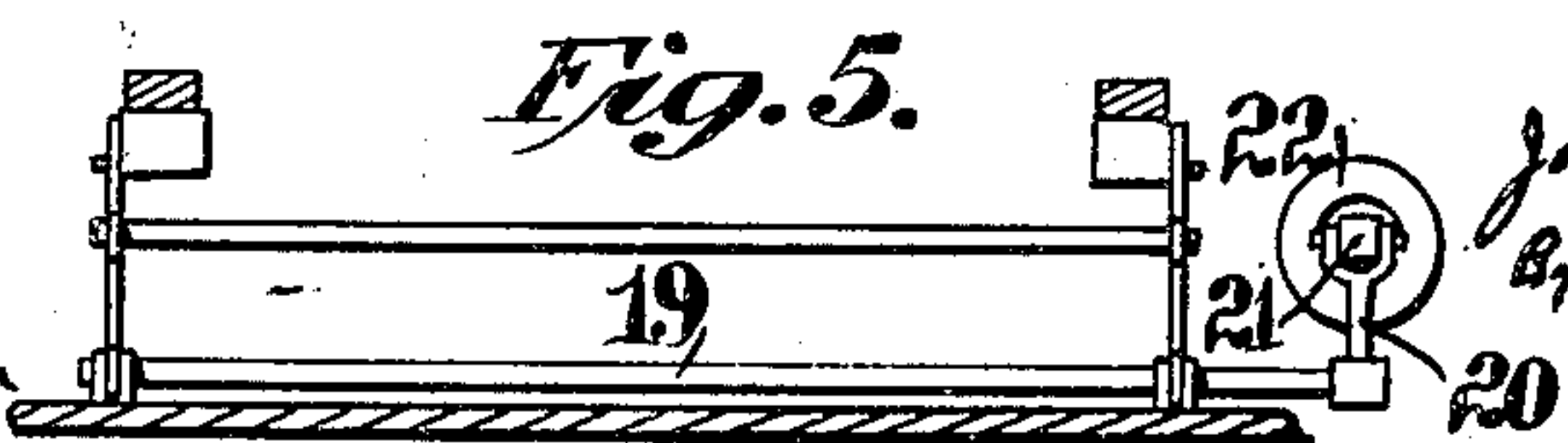


Attest:

W. Mitchell

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Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 6.

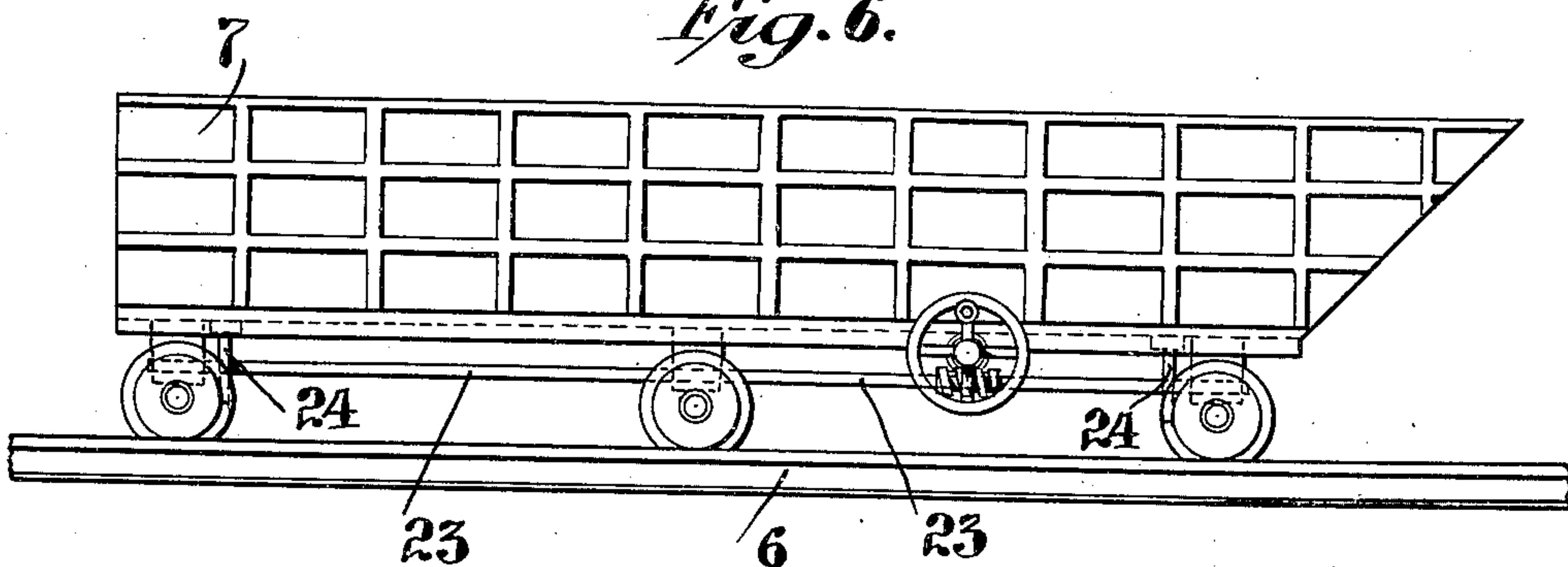
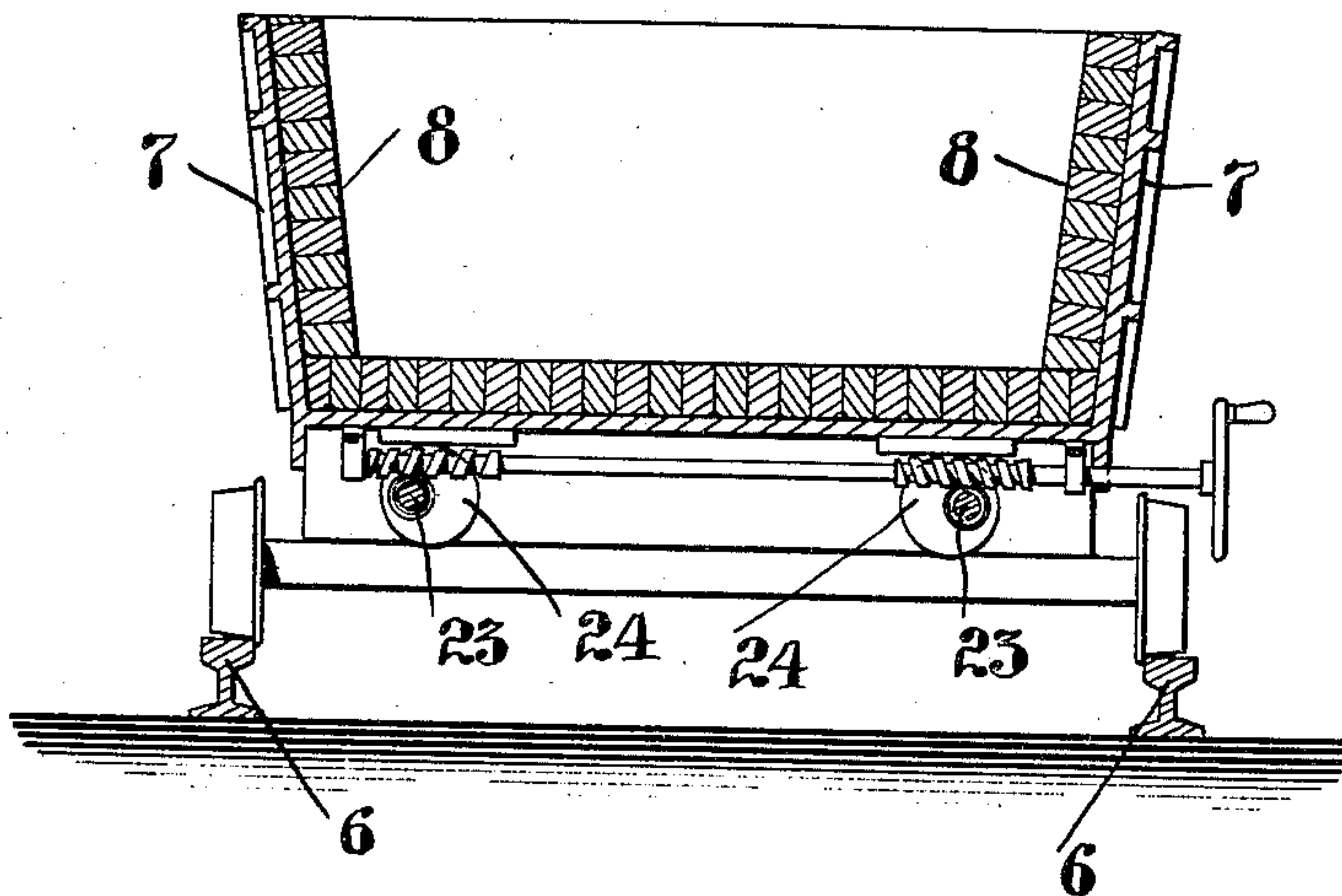


Fig. 7.



Attest:
Frank Rappman
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UNITED STATES PATENT OFFICE.

JOHN PUSEY McLIMANS, OF NEW YORK, N. Y.

FURNACE.

No. 908,311.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed January 29, 1908. Serial No. 413,205.

To all whom it may concern:

Be it known that I, JOHN PUSEY McLIMANS, a citizen of the United States, residing in the borough of Richmond, city of New York, county of Richmond, and State of New York, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in metallurgical and like furnaces and comprises improvements upon the invention disclosed in the patent to Carr and McLimans, No. 837,191, dated November 27, 1906, embodying means for removing debris from regenerator flues while the furnace is in operation. The structure of the said patent comprises a regeneratively heated furnace having flues leading to the regenerator chambers of a size adapting them to receive cars, and comprises also cars arranged to run upon tracks in said flues, said cars forming in effect the bottom closure or floor of said flues the structure being such that when any car is filled it may be removed without stopping the operation of the furnace and an empty car introduced in its place.

My present invention comprises means for making a tight joint between the car and the flue, so cutting off air currents which otherwise might interfere with the furnace draft and preventing escape of debris, otherwise than into the car itself, thus avoiding clogging of the rails on which the cars run; the said invention also providing means for freeing a car which may be stuck fast owing to cementing by sintered debris at the joint so formed.

In the operation of regeneratively heated furnaces of the basic open hearth type, and particularly with such basic open hearths, the strong draft through the furnace chambers picks up much debris and dust, fluxing materials, ore, etc., and tends to deposit its load in the usual downcomer flues leading to the regenerators. This flying dust, and especially with basic open hearth furnaces, is apt to have fluxing properties and to attack and corrode the flue walls. The debris from the furnace and from the flue walls deposited in the bottom of the flue from its sintered slaggy nature is usually called "slag" in the

art though far from being slag in the usual sense of fluxed liquid impurities tapped off from a furnace. In the operation of these regeneratively heated furnaces, it is customary to interrupt the running from time to time, tear out the bottom of the down flues leading to the regenerators, remove the accumulations and rebuild the flue. In the stated patent, the down flues are provided with removable, pocket-like bottoms which can be taken away from time to time, thereby obviating the delay and expense of the usual practice.

The object of my invention is to avoid clogging of the track rails and floor of the flue with debris etc., and to prevent the cars from sticking in place when it is desired to remove them.

I will now proceed to describe my invention with reference to the accompanying drawings, and will then point out the novel features in claims.

In said drawings: Figure 1 shows a fragmentary transverse section through a furnace provided with flues and cars as described, one of said cars being shown as it is when just run into coöperation with the flue, and the other being shown elevated slightly so that it makes a tight joint with the flue. Fig. 2 shows a side view of the car and a fragmentary transverse section of a portion of the walls of the furnace, and illustrates particularly the means for raising and lowering the car and for making a tight joint between the car and the flue; Fig. 3 shows a detail transverse section of the car; Fig. 4 is a side view and partial section of an alternative elevating device; and Fig. 5 shows a transverse section through such elevating device.

In the drawings, 1 designates a furnace, which may be understood to be a regenerative furnace of the general type illustrated in the said Carr and McLimans patent; my invention, however, being applicable to any type of regenerative furnace in which it is necessary to provide for the removal of slag, dust, ashes, etc., from the down flues. The invention being independent of any particular type of furnace, only a fragment of the furnace is shown. 2 designates the usual conduit for alternately supplying air to and withdrawing hot waste gases from the furnace, and 3 the flues for alternately supplying gas and withdrawing hot waste gases connected to down flues 4. At the bottoms of these

down flues are cross flues 5 provided with track rails 6 upon which cars 7 are run. Customarily the bodies of these cars are of metal and they are provided with a lining 8 of fire brick or the like. These cars are introduced into the flues through doors at the ends of such flues, not shown, which doors are kept closed except when a car is to be introduced or removed. In use, the car forms a pocketed bottom wall for the down flue, or a pocketed continuation of the floor of the cross flue. As shown, the sides of the cross flues are provided, directly above the cars, with projecting shoulders 9 and means are provided as hereinafter described for raising the car into contact with these shoulders and for lowering it again when the car is full, thereby giving a direct downward pull without lateral components, to break the adhesion of the car top to the brickwork. If the pull be lateral, there is more danger of dislodging the brickwork. Various means may be employed for so raising and lowering the car. One such means is illustrated in Fig. 2 and comprises secondary axles 10 carried by the car and carrying eccentrics or cams 11 provided on their faces with teeth 12 or equivalent means by which a pinch-bar may be engaged with the cam to pry it up or down, step by step. Instead of causing the cams to engage the track rail, as might be done, I preferably provide cradles 13 adapted to rest upon the track rails or any other convenient portion of the furnace structure, and which are provided with friction rollers 14 which the cams engage. There are two cams on each such false axle, one on each side of the car.

In the operation of this device, the car, having been run into the flue, and placed therein in the desired position, doors 15 in the sides of the flue are opened, the cradles 13 laid across the rails or otherwise (according as the cradles are constructed) said cradles coming directly beneath the cams 11; and these cams are then barred up step by step until the refractory lining of the car makes a joint with the ledges 9. If desired the car may be locked in such position by means of locking bolts 16, dropped into the space between two teeth of the cam; although ordinarily locking will not be required owing to the small throw of the cams. In most cases the throw of these cams need not be more than an inch or two; the scale on which the accompanying drawings are made making it necessary to exaggerate the throw.

One advantage of using the cradles 13 in conjunction with the cams, instead of causing the cams to act directly on the track rails, is that using these cradles, the rotation of the cams produce practically no tendency to move the car longitudinally; the eccentrics on the two false axles being oppositely placed as shown; it being important to

avoid longitudinal motion of the car, particularly when lowering it, in order that there may be as little tendency as possible to break away the shoulders 9. Another advantage of use of the cradles is that, such cradles being used, the cams may be made of smaller diameter than if they were to act directly on the track rails, and so said cams are out of the way when passing rail joints, switch-frogs etc., and are not likely to be injured in case of accidental derailment.

The car being in place and the furnace in operation, the car gradually fills with debris, etc., which falls or runs down the flues 4. The material has a tendency to solidify at the joint between the shoulders 9 and the lining of the car, so freezing the car in place, but such material being ordinarily of a glassy or sintered nature is quite brittle and readily broken if stress be applied to it. Such stress is applied, when it is desired to remove the car, by turning the cams 11 back so as to lower the car down upon the track rails. The weight of the car thus resting momentarily on the sintered material uniting the car to the shoulders 9, said material breaks, thus freeing the car entirely. Owing to the very excellent joint which may be made between the car and these shoulders 9, no debris can escape around the sides of the car and clog the track. It is therefore easy to remove and replace the cars, and the work required to raise the cars by means of the cams 12 is also relatively little.

Obviously the car may be raised in various other ways. It may, for example, be wedged up. One convenient mechanism comprising wedges by which the car may be so raised, is shown in Figs. 4 and 5, comprising sliding wedges 17 located beneath hinged sections 18 of the track rails and connected to rock shafts 19 provided with arms 20, the two arms connected by rods 21 and a screw turn-buckle 22. By screwing up this turn-buckle the wedges may be drawn together and the car raised; and conversely, by turning the turn-buckle backward the wedges may be retracted and the car caused to drop.

Instead of raising the car bodily, said car may be provided with means for raising and lowering the car body with reference to the truck. Figs. 6 and 7 illustrate such a construction, comprising longitudinal cam shafts 23 upon the car truck provided with cams 24 which, when said shafts are rotated, raise the car body bodily.

What I claim is:—

1. The combination with a regenerative furnace provided with a chamber adapted for metallurgical and like heating operations, and a down flue in communication therewith and adapted to receive debris therefrom, of a car movable into and out of engagement with said flue and adapted to make a joint therewith, and having a body

adapted to receive material from said flue, and means for raising and lowering said body to make and break joint.

2. The combination with a regenerative furnace having a heating chamber adapted for metallurgical and like heating operations and provided with a down flue in communication therewith and adapted to receive debris therefrom, said flue having joint forming shoulders, of a car movable into and out of engagement with said flue and provided with a body adapted to receive such debris therefrom and means for raising and lowering said body into and out of engagement with such joint forming shoulders.

3. The combination with a regenerative furnace provided with a down flue having an open bottom portion, of a car movable into and out of engagement with said bottom portion of said flue and means for raising and lowering said car comprising shafts and cams thereon adapted to be rotated.

4. The combination with a regenerative furnace provided with a down flue adapted to engage a car, of a car movable into and out of engagement with said flue and means for raising and lowering said car comprising transverse shafts and cams thereon adapted to be rotated.

5. The combination with a regenerative furnace provided with a down flue adapted

to engage a car, of a car movable into and out of engagement with said flue and means for raising and lowering said car comprising transverse shafts, cams thereon adapted to be rotated and cradles provided with friction rollers against which said cams may act.

6. The combination with a regenerative furnace provided with a down flue adapted to engage a car, of a car movable into and out of engagement with said flue and means for raising and lowering said car comprising transverse shafts and cams thereon, provided with teeth adapted to be engaged by a lever for moving said cams.

7. The combination with a regenerative furnace provided with a heating chamber, a down flue leading therefrom and a cross flue communicating therewith and forming a continuation thereof, of a car movable into and out of engagement with said flues at their junction and means for raising and lowering the same, said cross flue having joint forming means with which the car engages when so raised.

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

JOHN PUSEY McLIMANS.

Witnesses:

H. M. MARBLE,
W. M. CARR.