

G. A. WILLIAMS & H. A. THAYER.
ORE FEEDING MEANS FOR FURNACES.
APPLICATION FILED APR. 12, 1916.

1,247,050.

Patented Nov. 20, 1917.

3 SHEETS—SHEET 1.

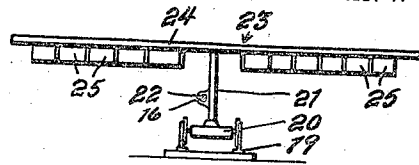
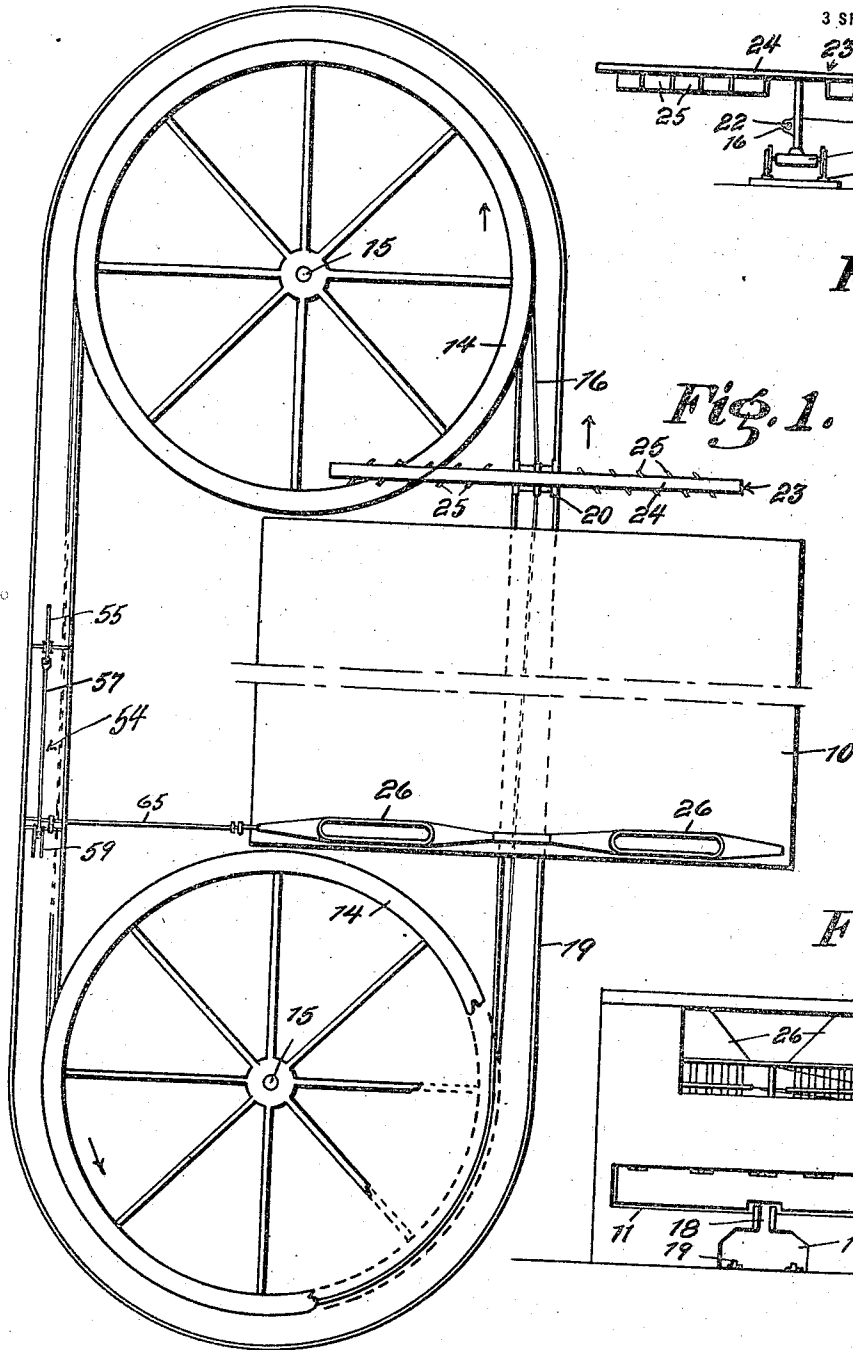
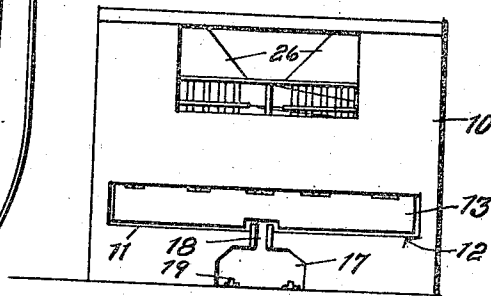


Fig. 3.

Fig. 1.

Fig. 2.



Witnesses
C. W. Hennings
M. W. Norfleet

Inventor
Glen A. Williams
Homer A. Thayer
By
E. W. Earnshaw
Attorney

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3 SHEETS—SHEET 2.

Fig. 4.

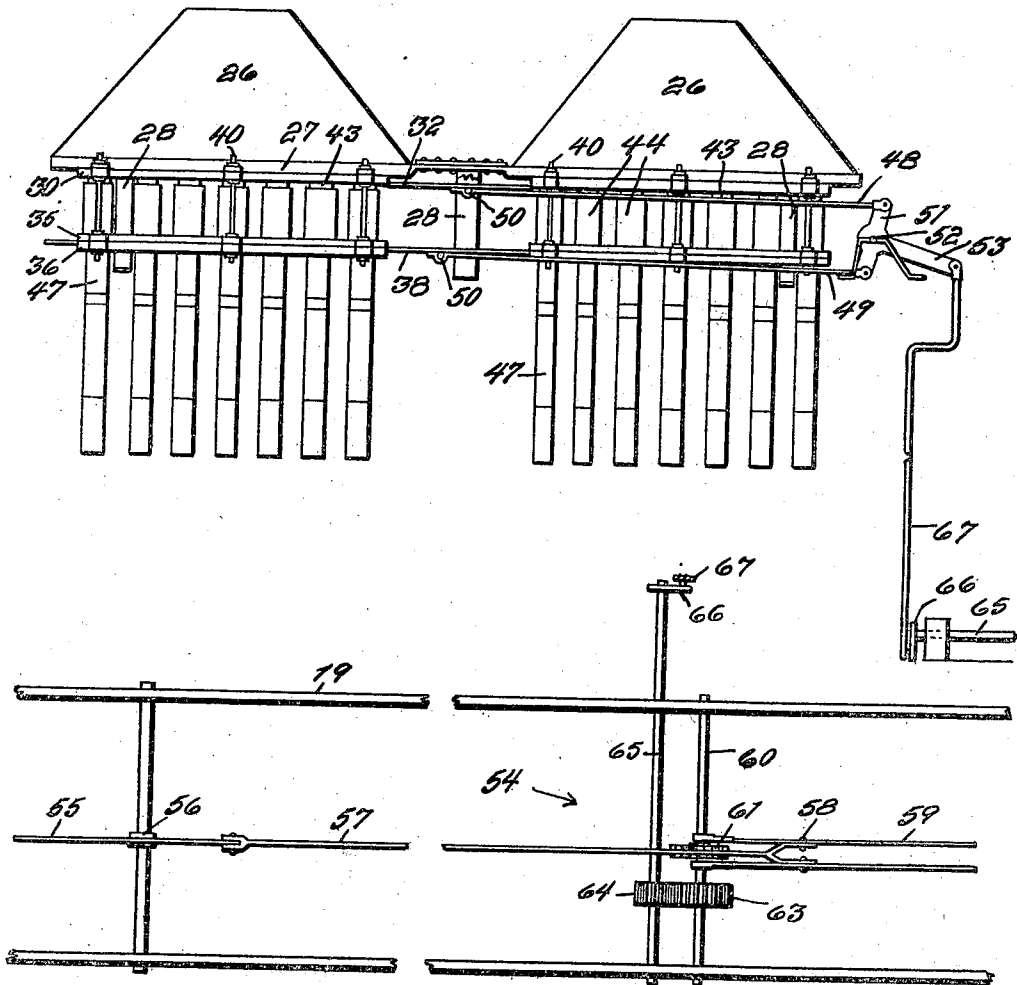


Fig. 5.

Witnesses.
O. W. Hennessey
M. W. Norfleet

Inventor
Glen A. Williams,
Homer A. Thayer,
By G. W. Earnshaw.
Attorney

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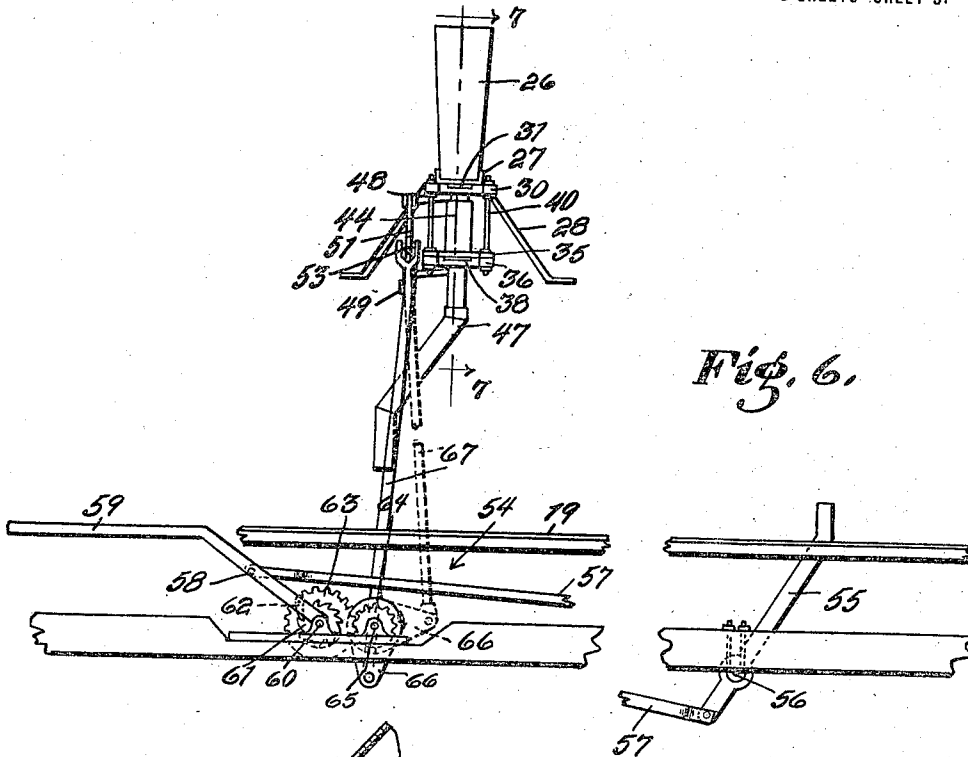


Fig. 6.

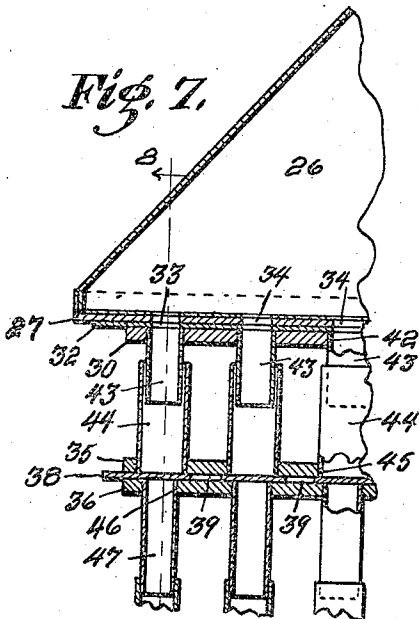


Fig. 7.

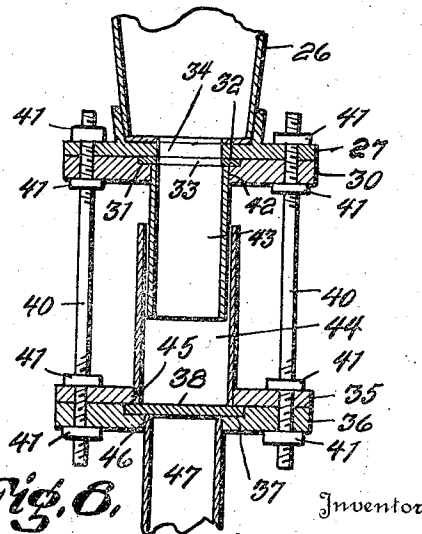


Fig. 8.

Witnesses.

P. W. Hennessy
M. W. Norflor

By

Glen A. Williams.
Homer A. Thayer

E. M. Carrshaw.

Attorney

UNITED STATES PATENT OFFICE.

GLEN A. WILLIAMS AND HOMER A. THAYER, OF PITTSBURG, KANSAS.

ORE-FEEDING MEANS FOR FURNACES.

1,247,050.

Specification of Letters Patent.

Patented Nov. 20, 1917.

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To all whom it may concern:

Be it known that we, GLEN A. WILLIAMS and HOMER A. THAYER, citizens of the United States, residing at Pittsburg, in the county of Crawford and State of Kansas, have invented certain new and useful Improvements in Ore-Feeding Means for Furnaces, of which the following is a specification.

The present invention relates to improvements in furnaces for roasting ores, such for example as zinc ores, for extracting the sulfur before it goes to the smelting furnace, while the invention is in no sense restricted to this use, and has particular reference to apparatus for use with such a furnace, to feed the ores into the heating chamber of the furnace or upon the bottom thereof, and to agitate, level, or work such ore while within the heating chamber.

An important object of the invention is to provide means of the above mentioned character, which operate wholly automatically to intermittently feed proper amounts of ore into the heating chamber of the furnace.

A further object of the invention is to provide means whereby the amounts of ore thus fed into the heating chamber may be regulated or varied.

A further object of the invention is to provide means carried by a traveling car or carriage to agitate, level, or work the material within the heating chamber, such car also serving to actuate the ore feeding means.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a plan view of apparatus embodying the invention,

Fig. 2 is a front elevation of the furnace, with parts omitted,

Fig. 3 is a similar view of a car or carriage,

Fig. 4 is a side elevation of the feeding mechanism,

Fig. 5 is a plan view of trip means for agitating the feeding mechanism,

Fig. 6 is a side elevation of the trip mechanism,

Fig. 7 is a vertical sectional view taken on line 7—7 of Fig. 6, and,

Fig. 8 is a transverse sectional view taken on line 8—8 of Fig. 7.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 10 designates an ore roasting furnace, the heating chamber of which is provided with a floor or bottom 11. Adjacent the floor is an opening 12, normally covered, at its forward end, by an inwardly swinging door 13. The rear end of this opening is normally covered by an outwardly swinging door (not shown) of similar construction. Arranged forwardly and rearwardly of the furnace 10 are horizontal grooved wheels or pulleys 14, mounted upon pivots 15. Either or both of these wheels may be driven by any suitable means, at a predetermined speed. Trained about the grooved pulleys 14 is a cable 16, having a portion extending upon one side of the furnace 10 and a portion extending through a tunnel 17, arranged beneath the bottom 11. This tunnel is provided in its top with a slot 18, leading into the opening 12.

The numeral 19 designates a track, of more or less elliptical shape. One portion of this track extends through the tunnel 17 while its ends extend about the wheels 14, beneath the same, as shown.

Mounted to travel upon the track 19 is a car or carriage 20, having a vertical support 21 rigidly secured thereto. This support is adapted to operate within the slot 18 and carries a lateral extension 22 for attachment to the cable 16. The numeral 23 designates a rake, comprising a horizontal beam 24, which is rigidly attached to the support 21. This beam has sets of angularly arranged teeth 25 secured to the lower side thereof, the teeth in one set extending in an opposite direction to the teeth in the other set. The rake 23 travels above the wheels 14 and is adapted to pass into the forward end of the opening 12, in proximity to the floor or bottom thereof, and travel longitudinally through this opening and out through the rear end thereof. The function of this rake is to agitate, level, and work the ore rearwardly toward the outlet end of the openings 12 from which it is discharged.

The ore is fed into the forward end of

the chamber of the furnace 10, preferably upon the floor 11 thereof, and for this purpose hoppers 26 are provided, disposed above the furnace 10 and suitably connected therewith. The hoppers 26 are secured to a plate 27. The plate 27 is rigidly mounted upon the top of the furnace 10 by means of supports 28.

Arranged beneath the plate 27 is a coacting plate 30, having a longitudinal recess 31, for receiving an upper reciprocatory valve plate 32. This valve plate 32 has openings 33, for movement into and out of registration with openings 34, formed in the plate 27 and the bottom of the hoppers 26. Arranged a substantial distance beneath the plates 27 and 30 is a horizontal plate 35, contacting with a plate 36, disposed therebeneath. The plate 36 has a longitudinal recess 37, receiving a reciprocatory plate valve 38, having openings 39. The pairs of plates 27, 30, and 35, 36 are adjustably connected by vertical rods 40, passing through apertures therein, and having screw-threaded portions receiving nuts 41. Rigidly mounted within openings 42 formed in the plate 30 are upper tubes 43, the upper ends of which are adapted for registration with the openings 33 in the upper valve plate. The upper tubes 43 telescope lower tubes 44, rigidly mounted in the openings 45 formed in the plate 35, and adapted for registration with the openings 39 in the valve plate 38. Each pair of coacting tubes 43 and 44 constitute a measuring receptacle for the ore, before the same is dumped into the heating chamber. It is apparent that by proper manipulation of the nuts 41 the tube 44 may be moved upwardly or downwardly with respect to the tube 43, thus adjusting or changing the volume of the measuring receptacle. Extending into openings 46 in the plate 36 are discharge conduits 47, the upper ends of which are in registration with the tubes 44 and therefore adapted for registration with the openings 39. The conduits 47 discharge into the forward end of the furnace 10 to dump the ore upon the bottom of the heating chamber near or at its forward end.

As more clearly shown in Fig. 4, pitmen 48 and 49 are pivotally connected with the valve-plates 32 and 38, as shown at 50, and these pitmen have pivotal connection with the opposite ends of a lever 51, pivoted upon a suitably supported shaft 52. Rigidly connected with the lever 51 is a lever 53, disposed at a right angle thereto.

Trip means, actuated by the car 20, are provided to move the lever 53, which are shown more clearly in Figs. 1 and 6. This trip means is designated as a whole by the numeral 54 and comprises a resetting trip lever 55, pivoted at 56, to swing in a substantially vertical plane. The trip lever 55

is arranged beneath the track 19 and its upper end extends upwardly above the track for a short distance, to contact with the forward end of the car 20 and to be swung forwardly and downwardly thereby. Pivotally connected with the lower end of the trip lever 55 is a pitman 57, extending forwardly for pivotal connection, as shown at 58, with an operating trip lever 59. This operating trip lever preferably embodies two levers which are pivoted to swing in a vertical plane upon a transverse shaft 60.

Rigidly secured to the shaft 60 between the levers 59 is a ratchet wheel 61, engaged by a pawl 62, pivotally connected with the trip lever or levers 59. The shaft 60 has a pinion or gear rigidly secured thereto, and engaging a pinion or gear 64, which is rigidly mounted upon a horizontal shaft 65. When the levers 59 are moved to the end of the down stroke, the same turns the larger pinion 63 for one-fourth of a revolution, this larger pinion turning the smaller pinion 64 in an opposite direction for one-half of a revolution. Rigidly mounted upon the opposite end of the shaft 65, is a crank 66, which normally occupies a vertical position, and is turned one-half of a revolution at a time, and is thus moved from one vertical position to another.

In explaining the operation of the apparatus, it should be stated that when the crank 66 is in the lower vertical position, the lever 53 is inclined, lever 51 inclined, valve plate 32 in a position whereby its openings 30 are in registration with the openings 34, so that the tubes 43 and 44 are filled, and the valve plate 38 is in a position whereby the openings 39 are moved out of registration with the tubes 44. Each time that the lever 59 is swung from its extreme upper position to the extreme lower position, the crank 66 is turned for one-half of a revolution, as above stated. This movement of the crank swings the lever 53 above the horizontal position and subsequently returns it to the lower vertical position. This movement of the lever 53 shifts the valve plate 32 so that its openings 33 are moved out of registration with the openings 34 and the openings 39 of the valve plate 38 move into registration with the tubes 44. The tubes 43 and 44 are thus dumped or emptied and when the lever 53 is returned to its lower vertical position the upper ends of the tubes 43 are again uncovered and the lower ends of the tubes 44 closed, thus allowing the tubes to refill with the ore.

At this point it might be well to state that when the car contacts with the trip lever 55 and moves the same downwardly, this trip lever resets the operating trip lever 59, returning the same to the upper position, while the pawl 62 trips upon the teeth of the ratchet wheel 61. When the car

passes over the trip lever 55 and contacts with the elevated operating trip lever 59, this trip lever 59 is moved to the lowered position, while the pitman 57 pivotally connected therewith automatically resets or elevates the lever 55. By this means the trip mechanism is wholly automatic and remains active permanently.

The car 20 is driven in the direction of its arrow at a suitable speed, by the rotation of the wheels 14 while the car may be propelled by any suitable means. The car travels through the tunnel 17 of the furnace, entering the forward end and leaving the rear end. The rake 23 travels with this car, in proximity to the floor or bottom 11, and serves to agitate, level, or work the ore toward the rear end of the opening 12, at which point it is discharged from the furnace. When the car 20 moves into proximity to the trip mechanism 54, its forward end contacts with the elevated end of the trip lever 55, swinging it rearwardly and downwardly. The car then contacts with the lever 59 swinging it downwardly, and elevating the trip lever 55 as above explained. This downward movement of the lever 59 turns the gear 64 clockwise for one-half of a revolution. The movement of this gear is transmitted to the crank 66, which moves the lever 53. The movement of the lever 53 shifts the valve plates 32 and 38 to dump the tubes 43 and 44, as hereinabove explained.

It is to be understood that the form of our invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. In apparatus of the character described, the combination with means for feeding ore into a furnace, of a track arranged near the furnace, a resetting trip lever disposed near the track, an operating trip lever disposed near the track, means connecting the levers so that the operating trip lever is elevated when the resetting trip lever is depressed, operating connecting means between the operating trip lever and

the ore feeding means, and a car to travel upon the track and contact with the trip levers.

2. In apparatus of the character described, the combination with a support, of a track arranged near and above the support, a resetting trip lever pivotally connected with the support to swing in a substantially vertical plane and extending downwardly below its pivot, an operating trip lever pivotally connected with the support to swing in a substantially vertical plane, a pitman pivotally connected with the resetting trip lever beneath its pivot and with the operating trip lever above its pivot, a car to travel upon the track and contact with the trip levers, and means to feed ore to a furnace and having operative connection with the operating trip lever.

3. In apparatus of the character described, the combination with a support, of a track arranged near and above the support, a resetting trip lever pivotally connected with the support, an operating trip lever pivotally connected with the support, a car to travel upon the track and contact with the trip levers, a shaft, a ratchet wheel rigidly mounted upon the shaft, a pawl connected with the operating trip lever and engaging the ratchet wheel, a gear turned by the shaft, a second gear engaging the first named gear, a crank operated by the second named gear, a pivoted lever having connection with the crank, and fuel feeding means for a furnace connected with the last named lever to be actuated thereby.

4. In apparatus of the character described; the combination with ore feeding means; of a re-setting trip lever; an operating trip lever disposed near the re-setting trip lever, means connecting the trip levers so that the operating trip lever is elevated when the re-setting trip lever is depressed; a traveling member to contact with the trip levers to operate them; and connecting means between the operating trip lever and the ore feeding means.

In testimony whereof we affix our signatures in the presence of two witnesses.

GLEN A. WILLIAMS.
HOMER A. THAYER.

Witnesses:

R. PAUL LEHMANN,
C. W. EYESTONE.