Oct. 9, 1934. R. E. McBEE 1,975,855

LOADER FOR ZINC FURNACES AND THE LIKE

Filed Oct. 28, 1933 2 Sheets-Sheet 1

Fig. 1.

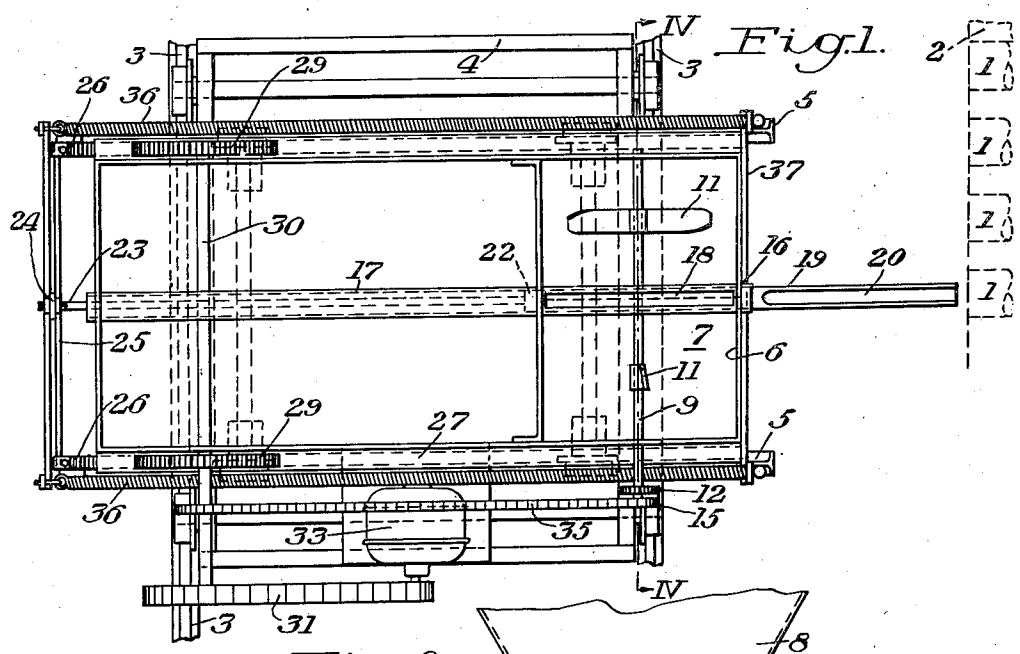
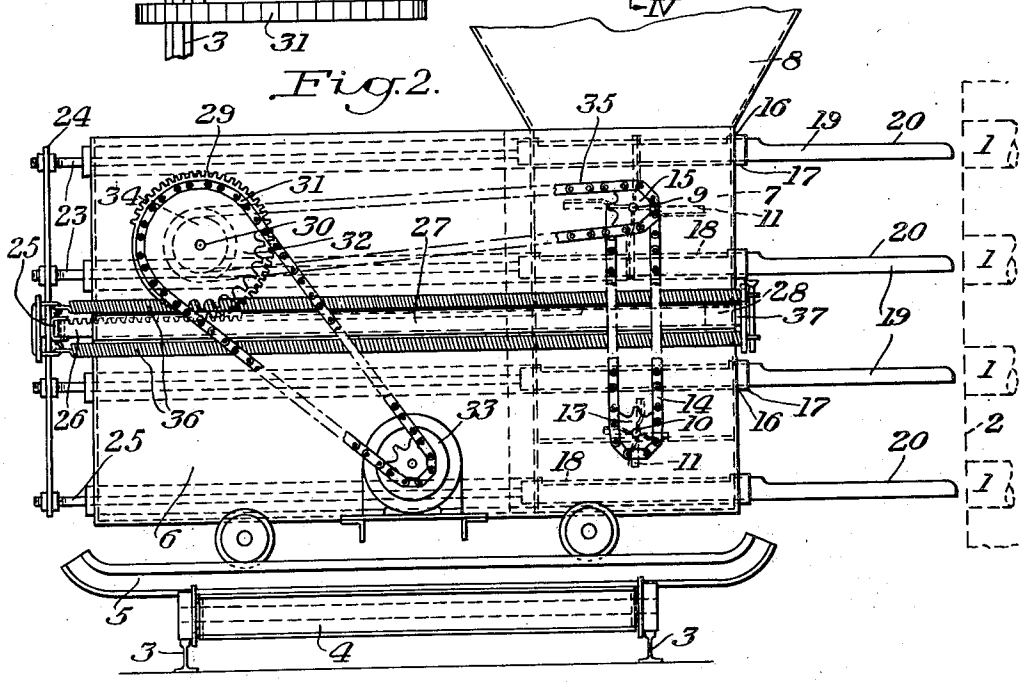


Fig. 2.



INVENTOR

Robert E. McBee,

by Edward A. Laucus.

his attorney.

Oct. 9, 1934. R. E. McBEE 1,975,855

LOADER FOR ZINC FURNACES AND THE LIKE

Filed Oct. 28, 1933 2 Sheets-Sheet 2

Fig. 3.

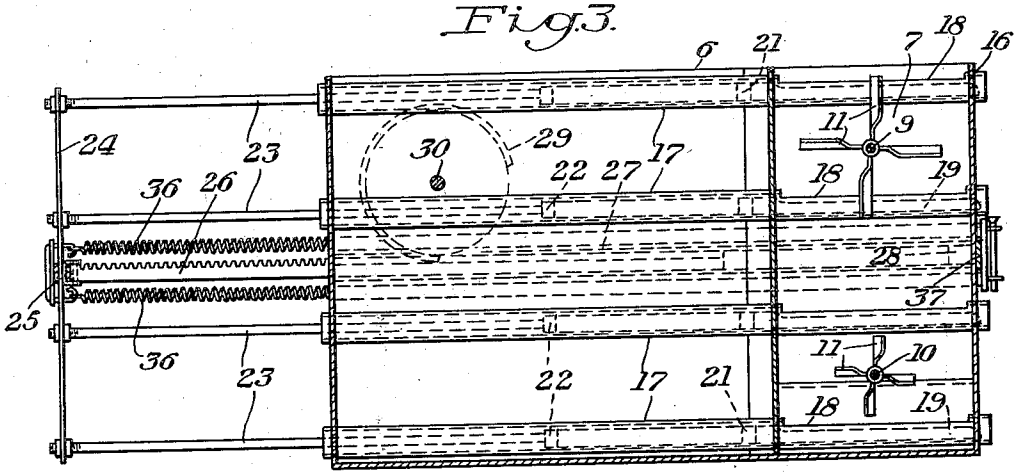


Fig. 4.

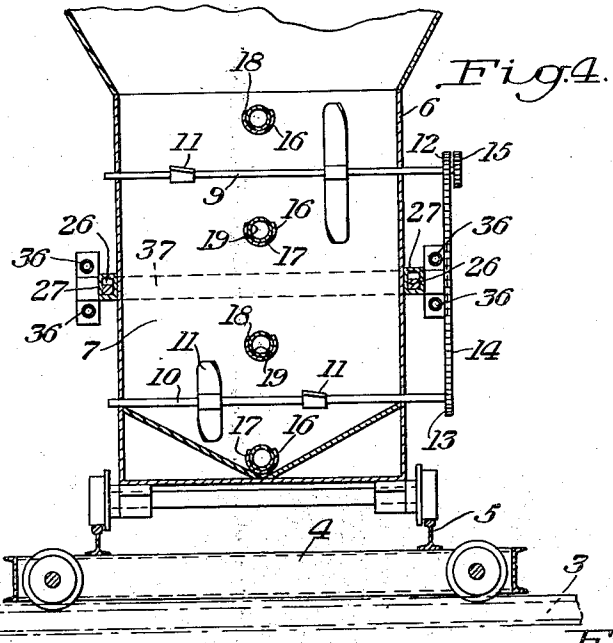


Fig. 5.

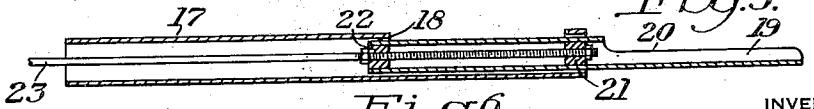
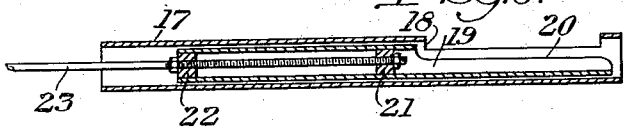


Fig. 6.



INVENTOR

Robert E. McBee

by Edward A. Lawrence.

his attorney.

Patented Oct. 9, 1934 1,975,855

UNITED STATES PATENT OFFICE

1,975,855

LOADER FOR ZINC FURNACES AND THE LIKE

Robert E. McBee, Smith Township, Washington County, Pa.

Application October 28, 1933, Serial No. 695,627

13 Claims. (Cl. 214—24)

Furnaces are commonly provided with a plurality of horizontally disposed retorts, formed of refractory material, and arranged in banks or groups, frequently four high and four wide, in the furnace chambers. These retorts are loaded by introducing the material, such as a mixture of powdered zinc ore and coal into the front ends of the retorts, which ends are then closed for the smelting or heating operation.

The object which I have in view is the provision of a more practical and efficient loader mechanism for use in connection with such furnaces.

Referring to the drawings, wherein I have illustrated a practical embodiment of the principles of my invention, Fig. 1 is a plan view showing the loader positioned in front of one of the vertical rows of a bank of retorts, with the injector scoops of the loader illustrated in extended position and the hopper omitted.

Fig. 2 is a side elevation of the same, the outer wall of the rack bar guide cut away to show the bar.

Fig. 3 is a plan view but showing the scoops retracted for refilling.

Fig. 4 is a cross-sectional view taken along the line IV—IV in Fig. 1.

Fig. 5 is a longitudinal section of a scoop and its guide tube, the scoop being shown extended.

Fig. 6 is a similar view with the scoop retracted.

Referring to the drawings, 1 represents the horizontally disposed retorts arranged in banks four high and four wide in the usual manner, and 2 represents the front wall of the furnace chamber. The retorts and furnace chamber are indicated in dotted lines in Figs. 1 and 2. During loading the front ends of the retorts and the front of the furnace are open.

3 represents twin rails laid along the front of the furnace 2, and upon which is mounted the wheeled truck 4. The truck 4 is provided with parallel and transversely disposed rails 5 upon which is mounted the wheeled carriage 6.

The body of the carriage may be of any desired form but for convenience is shown a rectangular open top box whose front is divided off by a vertical partition to form the filling bin 7, the upper portion of which is provided with a downwardly converging hopper 8. The side walls of the bin 7 preferably converge at the bottom, as illustrated in Fig. 4.

9 and 10 represent upper and lower horizontally disposed shafts whose ends are suitably journaled in the side walls of the bin 7 and which shafts are provided within the filling bin 7 with radially disposed paddles 11. The paddles serve to keep the finely divided material, with which the bin 7 and the hopper 8 are filled, loose and to prevent its bridging and packing. At one side the outer ends of the shafts 9 and 10 are provided, respectively, with sprockets 12 and 13 connected by the chain 14, and 15 represents a third sprocket mounted on the shaft 9 so that the shafts may be rotated in unison.

The front wall of the carriage 6 which also forms the front wall of the filling bin 7 is provided with a vertically disposed series of circular openings 16 arranged in vertical series and at the proper levels to be alined with the open ends of a vertical row of retorts 1 when the carriage is properly positioned. Similarly alined holes are provided in the partition and in the rear wall of the carriage.

17 represents tubes fixed in said holes and spanning the bin and the carriage longitudinally. The top walls of the portions of the tubes 17 which are exposed in the bin 7 are cut away as at 18 to permit the material in the bin to enter.

19 represents scoops slidably mounted in the tubes 17 and arranged to be retracted therein, as illustrated in Figs. 3 and 6 and to be extended forwardly therefrom as illustrated in Figs. 1, 2 and 5.

The front ends of the scoops 19 are open and their top walls cut away, as shown at 20 for such a distance that when the scoops are retracted, as shown in Figs. 3 and 6, such cut away portions register with and correspond to the cut away portions 18 of the tubes 17.

At the inner ends of the cut away portions 20 a block 21 is fixed in the bore of the scoop blocking the same, and a similar block 22 is fixed in the tubular portions of the scoops adjacent the rear ends of the latter.

23 represents connecting rods whose front ends extend through and are fixed in perforations in the blocks 21 and 22 and which extend rearwardly through the tubes 17 and are fixed at their ends to a vertically disposed header bar 24 which is in turn fixed to the horizontally disposed cross head 25. At its opposite ends the cross head 25 is fixed to the rear ends of a pair of rack bars 26 which slide in horizontal guide boxes 27 on the sides of the carriage 6. At their front ends said boxes are provided with rubber or other cushioning abutments 28.

The top walls of the boxes 27 are cut away adjacent the rear end of the carriage to expose the teeth of the rack bars 26 so that they may be engaged by the teeth of the incomplete gear wheels 29 which are mounted on the opposite ends of a

shaft 30 disposed transversely of the carriage 6 and suitably journaled therein. The shaft and gear are driven clockwise in Fig. 2 by means of a chain 31 connecting a sprocket 32 on the shaft 30 with the motor 33 supported from the carriage. 34 is a second sprocket on the shaft 30 connected by a chain 35 with the sprocket 15 on the shaft 9, thus providing for the rotation of the paddle shafts.

36 represents helical springs at either side of the carriage 6, having their rear ends connected to the cross head 25 while their front ends are connected to the opposite ends of a cross bar 37 which may be fixed to the front end of the carriage.

It is evident that the gear wheels 29 will intermittently move into mesh with the rack bars 26 and move the same to the left in the drawings, thus retracting the scoops 19 from their position in Fig. 1 to that in Fig. 3, until they nest in the tubes 17 within the filling bin 7 permitting the scoops to be loaded with material through the registering cut away portions 18 and 20 of the tubes and scoops, and that as the incomplete gear wheels move out of mesh with the rack bars, the springs 36 will throw the scoops forwardly from their position in Fig. 3 to that in Fig. 1, thus forcibly injecting the loads in the scoops into the open ends of the alined retorts 1. This reciprocating motion of the scoops, being alternately loaded from the filling bin and forcibly emptied into the retorts is continued until the vertical row of retorts is fully loaded, whereupon the truck 4 is moved along the rails 3 until its scoops are alined with the next vertical row of retorts.

After all the retorts of a bank or group are loaded, the carriage is retreated on the rails 5 away from the furnace and the ends of the retorts and the front of the furnace chamber closed and the smelting or reducing heat applied.

It is evident from the foregoing that by the use of my improved machine the loading of the zinc smelting and other furnaces may be substantially facilitated.

The loader is simple in construction, and durable and efficient in operation.

I claim:

1. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a tube extending through said bin and having a top opening for admission of material from the bin, a scoop slidably mounted in said tube and arranged when retracted to register with the opening in the latter, mechanical means for periodically retracting the scoop within the tube and into registry with the opening thereof for filling, and spring means periodically extended by the retraction of said scoop and then released to suddenly project said scoop to the end of the tube to forcibly inject the contents of the scoop into the retort.

2. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a tube extending through said bin and having a top opening for admission of material from the bin, a scoop slidably mounted in said tube and arranged when retracted to register with the opening in the latter, means for intermittently retracting said scoop for filling it with material, and spring means arranged to be extended by the retraction of the scoop and then released for projecting the scoop beyond the end of the tube to inject the contents of the scoop into the retort.

3. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a tube extending through said bin and having a top opening for admission of material from the bin, a scoop slidably mounted in said tube and arranged when retracted to register with the opening in the latter, means for intermittently retracting said scoop for filling it with material, and spring means arranged to be extended by the retraction of the scoop and then released to suddenly project said scoop to the end of the tube to forcibly inject the contents of the tube into the retort.

4. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a tube extending through said bin and having a top opening for admission of material from the bin, a scoop slidably mounted in said tube and arranged when retracted to register with the opening in the latter, a rack and incomplete gear device for intermittently retracting the scoop, and stored-power means effective between such retractions for forcibly extending the scoop beyond the tube to inject the contents of the scoop into the retort.

5. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a plurality of parallel tubes extending through the bin and having apertures formed in their walls for the entrance of material from the bin, a scoop slidably mounted in each of said tubes and arranged when retracted to register with the aperture to fill the scoop, a rack and incomplete gear device arranged to intermittently retract said scoops, and means effective between such retractions to forcibly extend said scoops beyond the tubes to inject the contents of the scoops into the retorts.

6. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a plurality of parallel tubes extending through the bin and having apertures formed in their walls for the entrance of material from the bin, a scoop slidably mounted in each of said tubes and arranged when retracted to register with the aperture to fill the scoop, a rack and incomplete gear device arranged to intermittently retract said scoops, and stored-power means effective between such retractions to forcibly extend said scoops beyond the tubes to inject the contents of the scoops into the retorts.

7. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a plurality of tubes extending through said bin, said tubes having apertures formed in their walls for the entrance of material from the bin, a scoop slidably mounted in each of said tubes and arranged when retracted to register with the apertures for filling the scoop, a rack moving in unison with said scoops, a continuous rotating incomplete gear arranged to mesh with the rack and periodically retract said scoops, and means effective when the rack and gear are out of mesh for forcibly extending said scoops beyond the bin to inject their contents into the retorts.

8. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a plurality of tubes extending through said bin, said tubes having apertures formed in their walls for the entrance of material from the bin, a scoop slidably mounted in each of said tubes and arranged when retracted to register with the apertures for filling the scoop, a rack moving in unison with said scoops, a continuous rotating incomplete gear arranged to mesh with

the rack and periodically retract said scoops, and stored-power means effective when the rack and gear are out of mesh for forcibly extending said scoops beyond the bin to inject their contents into the retorts.

9. In loader mechanism for retorts and other heat-treatment containers, the combination of a filling bin, a tube extending through said bin and having a top opening for admission of material from the bin, a scoop slidably mounted in said tube and arranged when retracted to register with the opening in the latter, means for facilitating the filling of the retracted scoop through said opening, mechanical means for periodically retracting the scoop in the tube into registration with the opening in the latter for filling the scoop, and spring means arranged to be placed under tension by the retraction of the tube and then released to suddenly extend the scoop to the end of the tube and forcibly inject the contents of the scoop into the retort.

10. In loader mechanism for retorts and other heat-treatment containers, the combination with a filling bin for the material to be loaded, of a substantially horizontal tube mounted within the bin and having an end open without the latter, said tube having an opening in its top wall for the admission of material, a scoop having a sliding fit within said tube, said scoop having a closed rear end and an open front end and top and said scoop being arranged to be alternately retracted in said tube to bring it in registry with said opening to load the scoop and to be projected forwardly to discharge its contents into the container, mechanical means arranged to periodically retract the scoop within the tube, and spring means arranged to be extended by the retraction of the tube and then released to suddenly project the scoop to the end of the tube and forcibly inject the contents of the scoop into the retort.

11. In loader mechanism for retorts and other heat-treatment containers, the combination with a filling bin for the material to be loaded, of a substantially horizontal tube mounted within the bin and having an end open without the latter, said tube having an opening in its top wall for the admission of material, and a scoop having a sliding fit within said tube, said scoop having a closed rear end and an open front end and top and said scoop being arranged to be alternately retracted in said tube to bring it in registry with said opening to load the scoop and forcibly projected forwardly to discharge its contents into the container, said scoop having a rear portion fitting the tube to act as a guide for its movements and to close the opening when said scoop is not retracted.

12. In loader mechanism for retorts and other heat treatment containers, the combination with a filling bin for the material to be loaded, of a substantially horizontal tube mounted within the bin and having an end open without the latter, said tube having an opening in its top wall for the admission of material, a scoop having a sliding fit within said tube, said scoop having a closed rear end and an open front end and top and said scoop being arranged to be alternately retracted in said tube to bring it in registry with said opening to load the scoop and forcibly projected forwardly to discharge its contents into the container, and means within the tube moving with the scoop to close the opening when the scoop is not in its retracted position.

13. In loader mechanism for retorts and other heat-treatment containers, the combination with a filling bin for the material to be loaded, of a substantially horizontal tube mounted within the bin and having an end open without the latter, said tube having an opening in its top wall for the admission of material, a scoop having a sliding fit within said tube, said scoop having a closed rear end and an open front end and top and said scoop being arranged to be alternately retracted in said tube to bring it in registry with said opening to load the scoop and forcibly projected forwardly to discharge its contents into the container, and means carried by the scoop within the tube to close the opening when the scoop is not in its retracted position.

ROBERT E. McBEE.