O. SAEGER.
MACHINE FOR CLEANING MUFFLES OR ZINC FURNACES.
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3 SHEETS—SHEET 2.

Fig. 2.

Witnesses:
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J. D. Penney

Inventor:
Otto Saeger,
By his Attorney,
F. Richards.
To all whom it may concern:

Be it known that I, Otto Sæger, general manager, a subject of the Emperor of Germany, residing at Schweinditzer Stadtgraben 26, Breslau, Germany, have invented certain new and useful Improvements in Machines for Cleaning Muffles or Zinc-Furnaces, of which the following is a specifica-

This invention relates to apparatus for mechanically removing the residues from the muffles of zinc furnaces. Heretofore this work was done by hand. In so doing, however, serious drawbacks were met with, such as the great heat of the furnace and the poisonous gases emanating from the residues, which seriously interfered with the work of emptying the muffles and greatly endangered the health of the workers.

When the muffles are attended to solely by hand the most powerful workers can hold out only for a shift of three hours. It is therefore desirable as far as possible to do away with manual labor in connection with the muffles of zinc furnaces.

A primary object of my invention is to provide a machine for cleaning the muffles which obviates the previously mentioned drawbacks by rendering all manual operations superfluous.

In the machine according to my invention I use screw conveyers for withdrawing the residues from the muffles. These screw conveyers are journaled on a truck which can be moved both parallel to the front of the furnace containing the muffle and also in the longitudinal direction of the muffles.

For this purpose a lower truck runs parallel to the furnace front and an upper truck runs in the direction of the muffles on the lower truck. As the muffles are inclined, the rails on which the upper truck travels on the lower truck must have an inclination corresponding to that of the muffle. A machine movable in the described manner admits of introducing screw conveyers into the muffle, removing them therefrom and traveling sidewise in order to work the conveyers in other muffles. When several conveyers are arranged in one machine it may happen that one of them abuts against the end of the muffle earlier than the others, whereby fractures in the machine might be caused. In order to avoid the same, I insert flexible con-

Connections between the conveyers and their driving shafts.

One illustrative embodiment of my invention and a modification thereof are represented by way of example in the accompanying drawings, wherein:

Figures 1 and 2 are side elevation partly in section, and top plan view, respectively, showing a machine for cleaning muffles, and Fig. 3 is a side elevation, partly in section, showing a cleaning machine which can also be used for charging.

Referring firstly to Figs. 1 and 2, on the frame 1 of the lower truck is mounted a motor 2 driving the shaft 4 through the medium of worm wheel gearing 3. The motion of this shaft is imparted by bevel gears 4, 5 to the shaft 6 on which is provided a double friction clutch 6. The edges of the friction clutch are formed as spur gears 7 and 7'.

The said spur-gear 7' is in mesh with the pinion 10, which in turn meshes with the spur-gear 8 which is mounted upon the shaft 11. The opposite clutch-gear 7 meshes directly with the spur-gear 9, which is also mounted upon the shaft 11. It is obvious that through this arrangement, the shaft 11 may be rotated in alternate directions accordingly as the clutch-gears 7 or 7' are engaged by the clutch. On the shaft 11 is a double claw clutch 12 which can drive either the shaft 14 through the medium of the pinion 13, or the shaft 21 through the medium of the gears 19 and 20. On one end of this shaft 14 is a bevel gear 14' meshing with the bevel gear 15 fast on the shaft 16. The latter shaft carries two rope drums 16', 16'' on which two ropes 17 are wound right-handedly and two ropes 18 left-handedly.

The ropes 17 and 18 are attached to the gear casing or frame 15' of the upper truck, so that the upper truck can be run forward and backward on the track 38 of the lower truck by the shaft 16. The above-mentioned shaft 21 serves as a truck axle and is provided with the wheels 22 for the lower truck.

The described part of the machine operates as follows: When the claw clutch 12 is thrown into engagement with the gear 13 by means of the reversing lever 23 and with the aid of the lever 24 for actuating the friction clutch 6, the upper truck can be driven, the arrangement being such that when the lever 24 is tilted over toward the furnace,
the upper truck travels in the same direction, while when the lever 24 is tilted over to the rear i.e. away from the furnace, the upper truck likewise travels to the rear.

When the claw clutch 12 engages with the gear 19, the upper truck can be caused by the friction clutch to travel to the right or to the left.

A motor 25 for driving the screw conveyers 33 is built into the U-iron frame of the upper truck. The motor imparts its motion by the pinion 27 and spur gear 28 to the shaft 29 and to the middle screw conveyor 32, and the gears 30, 31 impart the motion thereof to the outside screw conveyers 32. The gears 30, 31 are journaled in the gear casing 33. The shafts 31* carrying the gears 31 are pivotedly connected with the screw conveyers 32.

A guide 34 is provided on the gear casing 33 for the seats or conveyor holder 35. In order to be able exactly to adjust the conveyers or scrapers 32 to the muffles, the holders 35 can be adjusted to the correct height in the guide 34. The rods or stems of the scrapers are in two parts connected by gas piping 37 and a spring 36, whereby I arrange that the lengths of the rods can be varied to adapt them to muffles of unequal length.

In order to be able also to employ the described machine for charging muffles, as shown in Fig. 3 it must be modified somewhat. The principle of the machine remains the same, however. A charge hopper 39 has to be provided on the machine. The ore is fed from this hopper through a vertical distributing pipe 40 to the short pipes 41 from which the screw conveyers issue.

Each of the conveyers is surrounded by a casing 42, as indicated in Fig. 3 in dotted lines at the bottom conveyor. When in such a cleaning machine the direction of rotation of the conveyers is the reverse of that obtaining when cleaning the muffles, the conveyers feed the ore falling out of the hopper into the muffles. The conveyers, however, are not driven along the bottom of the muffles as when cleaning the same, but under the top thereof as is indicated in dotted lines in the lower part of Fig. 3. In order uniformly to distribute the ore in the muffles it is only necessary to introduce into the muffles at a constant speed the conveyers rotating at a constant speed, and when they have entirely entered therein to withdraw them at the same speed.

I claim:

1. In a machine for cleaning inclined muffles of zinc furnaces, the combination with a lower truck for running parallel to the front of a furnace and having an inclined track at right angles thereto, of an upper truck movable on the said track, one or more screw conveyers carried by the upper truck, and means on the upper truck for driving the one or more conveyers, the inclination of said track corresponding to the inclination of the muffles.

2. In a machine for cleaning the muffles of zinc furnaces, the combination with a lower truck for running along the front of a furnace, of an upper truck movable on the lower truck in a direction at right angles thereto, one or more screw conveyers carried by the upper truck, and means on the upper truck for driving the one or more conveyers, each conveyor including an elastically connected two-part rod or stem.

3. In a zinc muffle cleaning machine, the combination with a pair of trucks mounted one upon the other, of a muffle cleaning apparatus consisting of one or more extensible conveyers resiliently mounted upon one of the said trucks, said conveyers adapted to be moved into said muffles and to be rotated therein, and means on the other of said trucks for causing said rotation.

4. In a machine for cleaning the muffles of zinc furnaces, the combination with a primary truck adapted to move along the front of a furnace, and having an inclined track at right angles thereto, of a secondary truck movable on said track, one or more extensible screw conveyers resiliently mounted upon said truck, and adapted to extend into inclined muffles thereof to remove the contents thereof, the inclination of said track corresponding to the inclination of the muffles.

In witness whereof I have hereunto signed my name this 31st day of August 1911, in the presence of two subscribing witnesses.

Witnesses:

OTTO SAEGER.

HENRY HASPER,
WOLDEMAR HAUPT.