April 27, 1937. R. S. FEARNSIDE 2,078,905

CONTINUOUS HEAT TREATING FURNACE

Filed Dec. 9, 1935 2 Sheets-Sheet 1

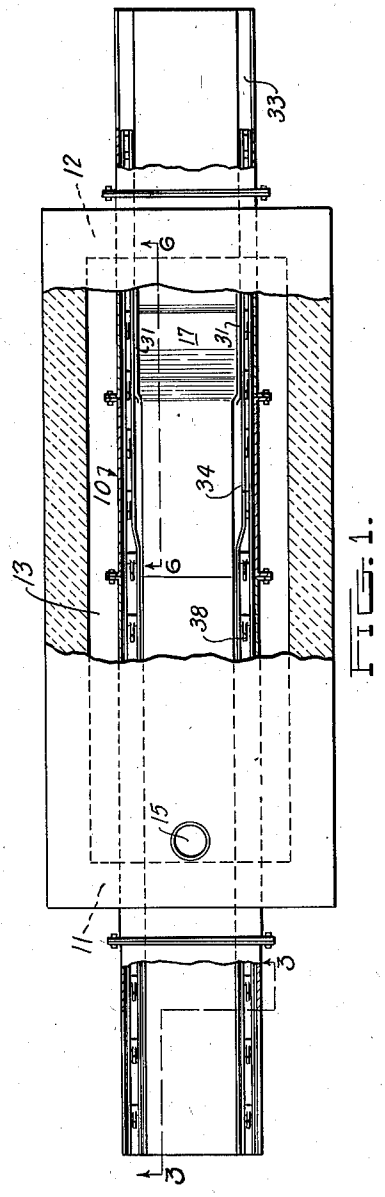


FIG. 1.

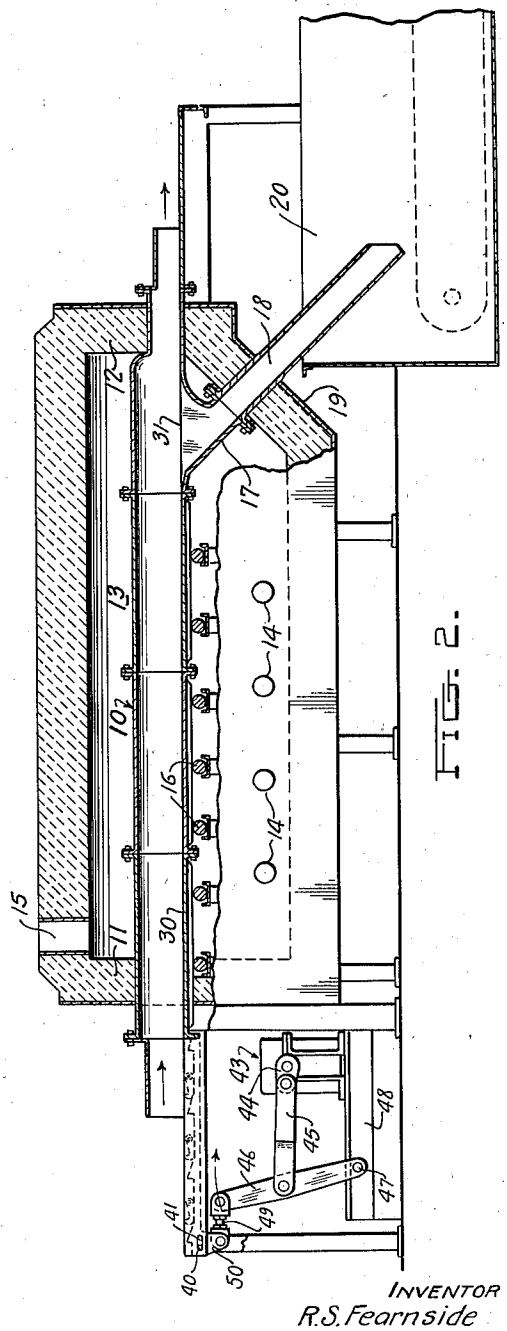


FIG. 2.

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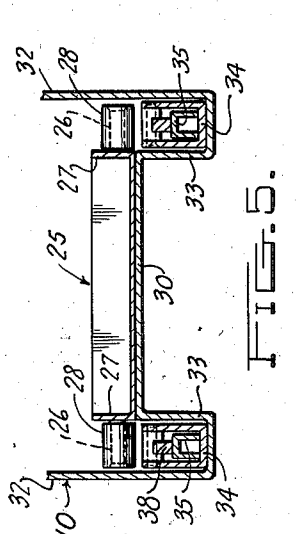


FIG. 5.

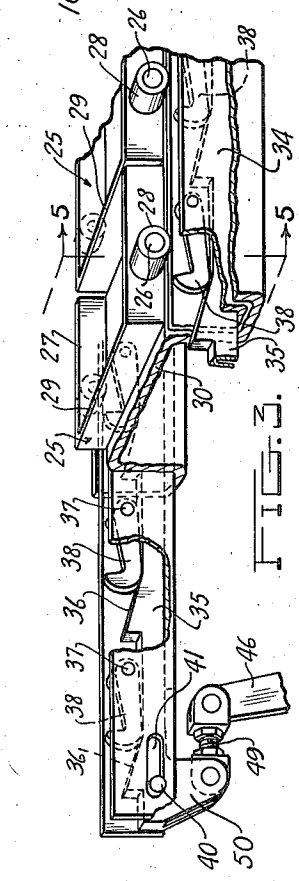


FIG. 3.

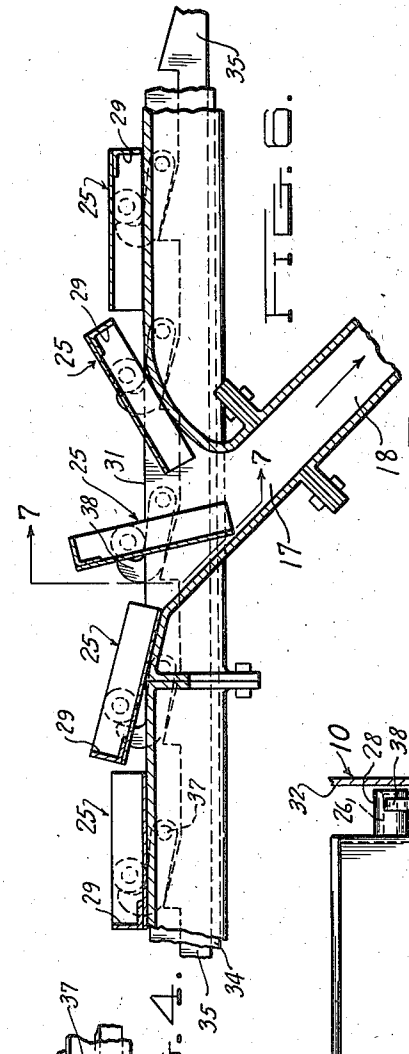


FIG. 6.

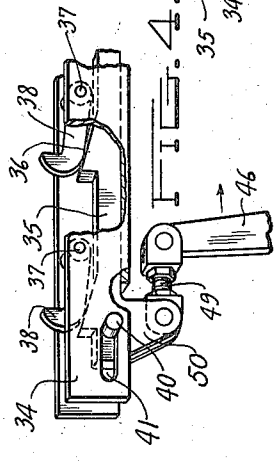


FIG. 4.

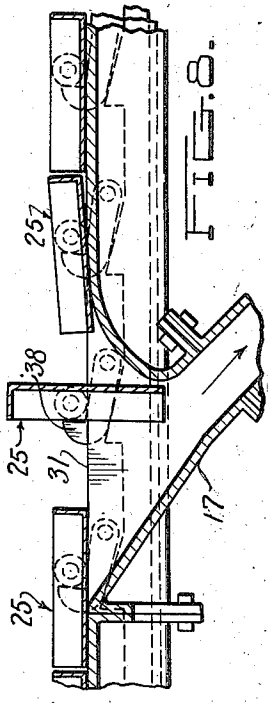


FIG. 8.

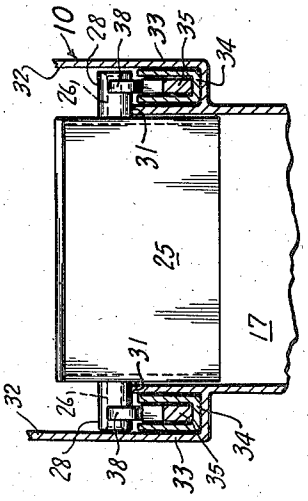


FIG. 7.

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UNITED STATES PATENT OFFICE

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CONTINUOUS HEAT-TREATING FURNACE

Ralph S. Fearnside, Detroit, Mich., assignor to Surface Combustion Corporation, Toledo, Ohio, a corporation of New York

Application December 9, 1935, Serial No. 53,506

9 Claims. (Cl. 198—218)

This invention has for its object to provide a heat-treating furnace which shall embody improvements in means for moving trays or the like through the furnace in a manner to permit the trays to tilt and dump their contents in passing across the mouth of a chute in the furnace.

The various features of novelty and invention will be fully explained in connection with the accompanying drawings forming part of this specification and wherein,—

Fig. 1 is a top plan view of the improved furnace with parts broken away to show certain features of construction;

Fig. 2 is a side elevation of the furnace with parts in section the parts in section being along the medial line of the furnace;

Fig. 3 is a fragmentary sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view of parts shown in Fig. 3;

Fig. 5 is a cross sectional view taken on line 5—5 of Fig. 3;

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 1;

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

Fig. 8 is a view similar to Fig. 6 except that it shows how by arranging the pans end for end as compared with those in Fig. 6, the pans will pass out of the heating chamber right side up instead of upside down as in Fig. 6.

The heating chamber of the furnace is a metal muffle 10 which extends between and through the end walls 11 and 12 of a firing chamber 13 which is fired in any preferred way as by burners 14 in the side walls thereof, the chamber having an opening 15 in its roof for the escape of products of combustion.

The muffle is supported on rollers 16 in the chamber 13 to permit expansion and contraction of the muffle. At a point near the exit end of the muffle is a chute 17 the mouth of which is in the floor of the muffle. This chute has an extension 18 which passes through an upwardly angled bottom portion 19 of the chamber 13 and thence into a quench tank 20.

The trays which are to be passed through the muffle are generally indicated at 25. Each tray is in the form of a pan having oppositely extending side fingers 26. Each pan has side walls 27 but has only a single end wall 29. The fingers are shown as provided with sleeve rollers 28 but such rollers need not be provided. The pans enter the muffle at the left hand end thereof as viewed in Figs. 1 and 2; and while they are being moved toward the chute 17 they rest on a platform 30 which is part of the muffle floor. In passing the mouth of the chute 17 the pans are supported by their fingers 26 on a track 31 whereby to permit the pans to tilt and dump their contents into the chute. The pans may be arranged to enter the muffle with their respective end walls 29 to the rear of their fingers 26 in which event after dumping their contents they will pass out of the muffle bottom side up as shown in Fig. 6; or they may be arranged to enter the muffle with their respective end walls 29 in advance of their fingers in which event after dumping their contents they will pass out of the muffle right side up as shown in Fig. 8. On emerging from the muffle the pans are manually carried back to the front end of the muffle for reloading preparatory to again being passed through the muffle as will now be understood.

The side walls of the muffle are indicated at 32 (see Figs. 5 and 7) and these walls extend below the level of the platform 30 whereby to form side channels 33 at either side of the platform. These channels extend throughout the full length of the muffle. Where the channels pass the mouth of the chute 17 their inner side walls at their upper edges together constitute the track 31 previously referred to for supporting the pans 25 on their fingers 26 as the pans pass across the mouth of the chute. Since the mouth of the chute is necessarily somewhat wider than the platform 30, to permit the pans to tilt in passing said mouth, the inner side walls of the channels are closer to the respective side walls 32 of the muffle (and from that point on to the exit end of the muffle) then in their preceding portion (in this connection see Figs. 5 and 7).

Slidably supported in each channel 33 is a U-shape beam 34 of a length to extend through and beyond the ends of the muffle; and slidably supported on and between the side walls of each beam is a bar 35 the top side of which is of sawtooth form to provide a series of inclines 36. Extending between and supported by the side walls of each beam 34 is a series of uniformly spaced pivot pins 37 and mounted on each pin is an upturned hook 38, the free end of each hook resting on the underlying bar 35. The distance between the pins 37 is the same as the distance between the inclines 36 and the distance between the inclines is at least as great or greater than the length of the pans 25. The length of the hooks is, of course, less than the distance between the inclines.

The purpose of the bars 35 is to raise and lower

the hooks 38 and this is, of course, accomplished by moving the bars relatively to their respective beams 34. A pin and slot connection or other equivalent mechanism limits the distance that the bars can be moved relatively to their beams to that which is required to raise and lower the hooks. A pin and slot connection is shown; the pin 40 is shown as carried by the bars 35 slot 41 as being formed in the side walls of the beams 34. When the hooks are in elevated position they extend sufficiently above the level of the platform 30 to interengage with the pan fingers 26 whereas when they are in lowered position they are free to pass below said fingers. It will, therefore, be readily appreciated that by moving the beams toward the right when the hooks are in elevated position the pans 25 will also be moved toward the right.

The bars 35 are moved with respect to their beams 34 and the latter are reciprocated by one and the same mechanism. This mechanism is shown as comprising a power operated device 43 having a crank 44 to which is connected a link 45 having two arms which connect with individual upright levers 46 pivoted as at 47 to a base 48 the upper ends of the levers being connected by links 49 to lugs 50 integral with the bars 35.

It will now be readily appreciated that the bars 35 are reciprocated through a stroke which is longer than the stroke of the beams 34; that at the beginning of each stroke of the bars the beams remain at a standstill until the bars have traveled the distance permitted by the lost motion between the bars and beams; that after the bars have traveled the said distance the beams are moved along with the bars to the end of the stroke of the latter, and that although the pans are moved simultaneously they are nevertheless moved independently of each other.

What I claim is:

1. In apparatus for sliding objects along a longitudinally extending support, the combination comprising a reciprocable beam which extends lengthwise of said support, a reciprocable bar slidably supported on the beam, and means for reciprocating the beam and bar as a unit including means for moving the bar a portion of its stroke before the beam is moved along in the same direction as the bar.

2. In apparatus for sliding objects along a longitudinally extending support, the combination comprising a reciprocable beam extending lengthwise of said support, a reciprocable bar supported on the beam, the stroke of the bar being greater than that of the beam, means for continually reciprocating the bar, and means for moving the beam along with the bar after the latter has traveled a distance equal to the difference in length between the said strokes.

3. In apparatus for sliding objects along a floor having a channel extending longitudinally thereof, the combination comprising a reciprocable beam slidably supported in said channel, a reciprocable bar slidably mounted on said beam, the bar having a longer reciprocating stroke than the beam, means for continually reciprocating the bar, and means for causing the beam to travel with the bar after the bar has traveled a portion of its stroke.

4. In apparatus for sliding objects along a longitudinally extending support, the combination comprising a reciprocable beam, vertically movable means carried by the beam, and a longitudinally reciprocable bar carried by said beam for raising said vertically movable means before the beam is moved in one direction and for lowering the same before the beam is moved in the opposite direction.

5. In apparatus for sliding trays having trunnions along a support, the combination comprising a reciprocable beam extending lengthwise of said support, a reciprocable bar carried by said beam and having a series of inclines on its upper side, a series of upturned hooks adapted to engage with said trunnions and pivoted to said beam and arranged to be raised and lowered by said bar as the latter is reciprocated, means for reciprocating the bar, and means including said bar for reciprocating said beam.

6. In apparatus for sliding objects along a longitudinally extending support, the combination comprising a reciprocable beam extending lengthwise of said support, a bar slidably supported on said beam, a lost motion connection between the beam and bar for permitting limited longitudinal movement therebetweeen, means for reciprocating the bar through a stroke which is more than sufficient to take up the slack provided by the lost motion connection whereby to cause the beam to be moved along with the bar after the said slack is taken up, and vertically movable means adapted to engage said objects and carried by the beam and arranged to be raised and lowered by said bar as the latter moves longitudinally with respect to the beam.

7. In apparatus for sliding trays having trunnions along a floor having a longitudinally extending channel, the combination comprising a beam arranged in the channel, means including a reciprocable bar on the beam for reciprocating the beam, and means including vertically movable means carried by the beam for moving the trays along the floor as the beam is reciprocated.

8. In apparatus for sliding trays having trunnions along a floor having two parallelly extending channels, the combination comprising a beam arranged in each channel, a bar slidably supported on each beam, means including said bars for reciprocating the several beams in unison, means including vertically movable means on each beam for engaging said trunnions for moving the trays along the floor as the beams are reciprocated, said floor having its longitudinal continuity interrupted by an unbridged space, and a track at either side of said space for tiltably supporting each tray on its trunnions as it is moved across said space.

9. In apparatus for sliding trays having trunnions along a support, the combination comprising a beam, means for reciprocating the beam, means including a series of upwardly-facing hooks hinged to the beam for engaging said trunnions for moving the trays along said support as the beam is reciprocated, and means slidably carried by the beam for raising and lowering the hooks.

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