Aug. 1, 1939. F. T. COPE 2,167,640

LUBRICATING CONSTRUCTION FOR ROLLER RAILS FOR FURNACES

Filed May 31, 1938 2 Sheets-Sheet 1

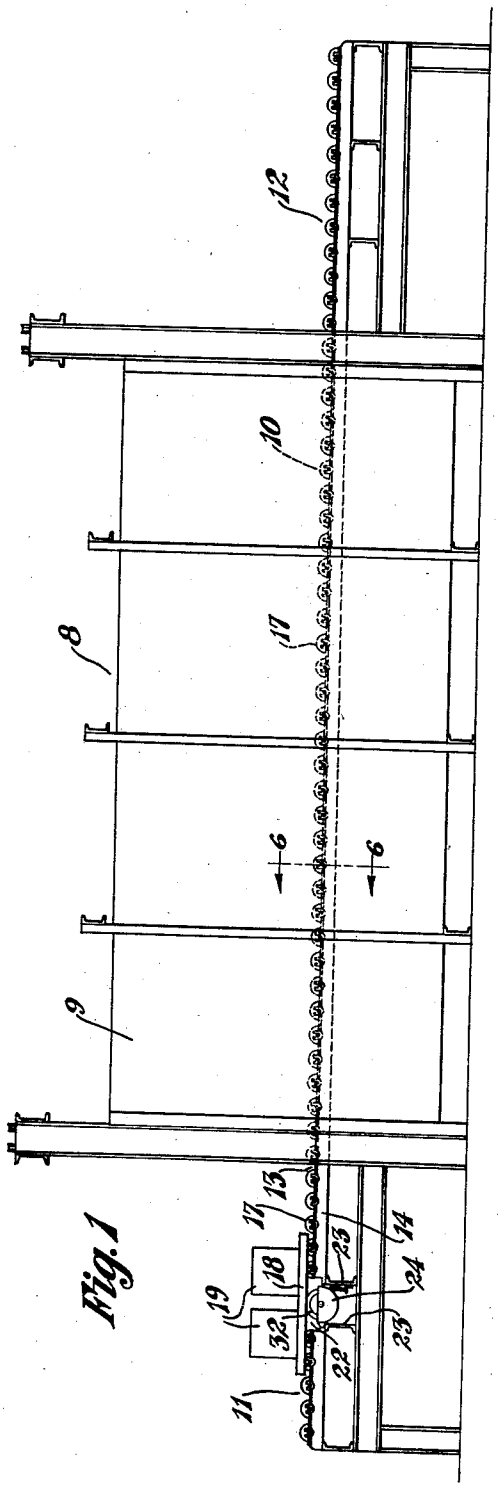


Fig. 1

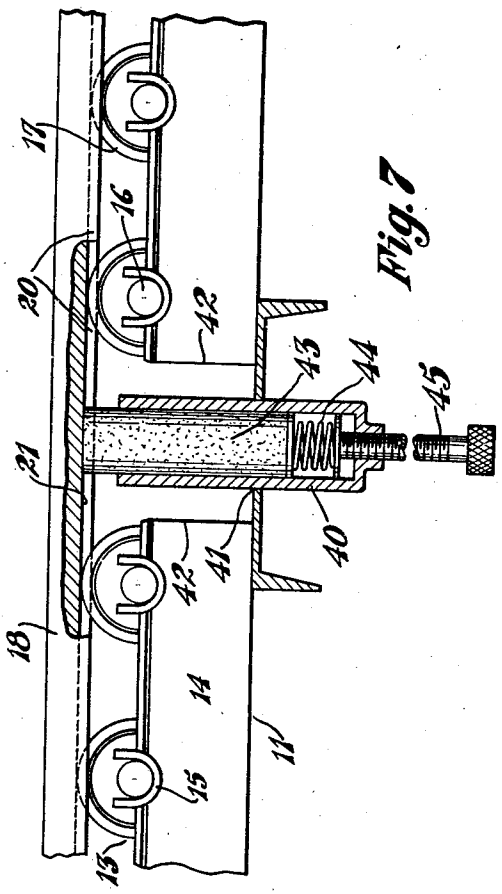


Fig. 7

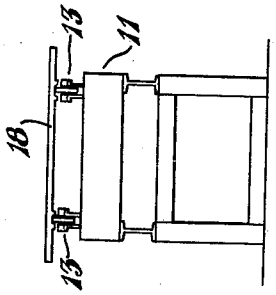


Fig. 2

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LUBRICATING CONSTRUCTION FOR ROLLER RAILS FOR FURNACES

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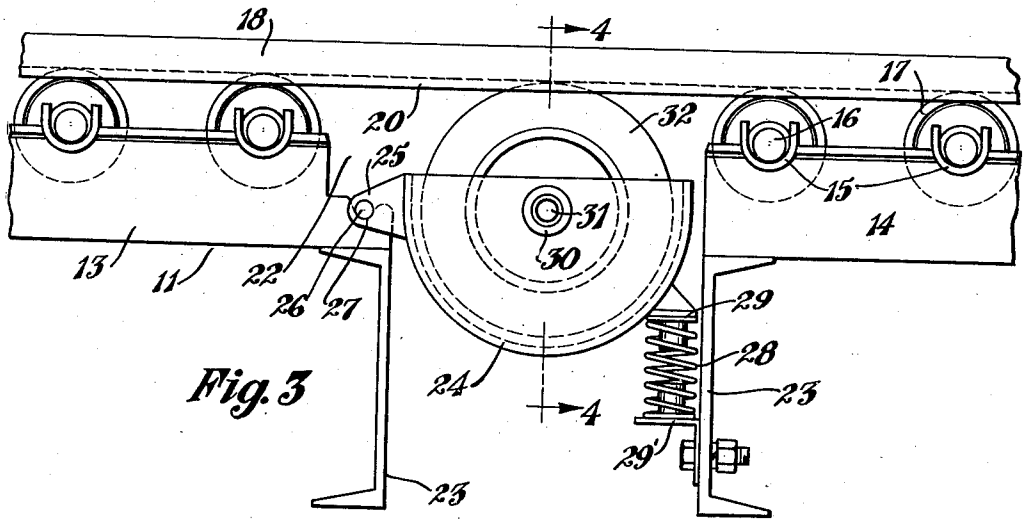


Fig. 3

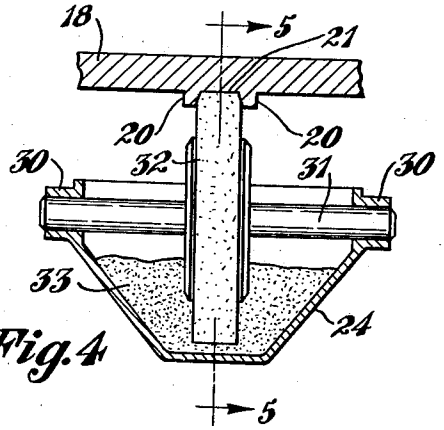


Fig. 4

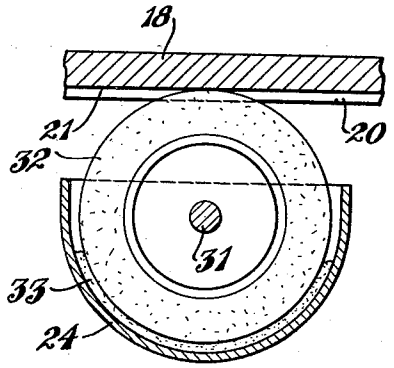


Fig. 5

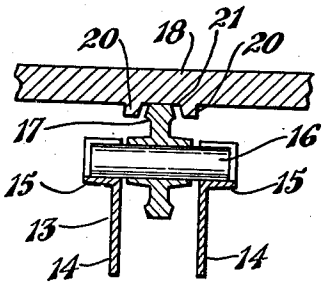


Fig. 6

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LUBRICATING CONSTRUCTION FOR ROLLER RAILS FOR FURNACES

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Application May 31, 1938, Serial No. 210,926

9 Claims. (Cl. 184—1)

The invention relates generally to roller hearth furnaces and the like which have a heating chamber through which material to be treated or heat treated is moved on trays or other suitable means which pass along a roller hearth.

More particularly, the invention relates to a means of lubricating the hearth construction within the furnace along which the trays or the like are moved in passing through the furnace heating chamber.

Roller tables or conveyors of various kinds and types are used extensively in manufacturing plants and ordinarily such roller tables are easy to lubricate. Roller tables and roller hearths are also used in connection with heating and heat treatment furnace construction; and while it is easy to lubricate the table rollers outside of the furnace, it is quite difficult to lubricate the table rollers or hearth passing means within the heating chamber of the furnace.

This difficulty causes hearth rollers within a furnace to wear very rapidly because of dry bearings or because of seizing or sticking of the roller shafts in their bearings. As a result, frequent and expensive replacement of bearings and roller shafts must be made, which can ordinarily only be performed when a furnace is shut down.

Moreover, whenever dry bearings or seized or stuck rollers occur, a high coefficient of friction results, either with respect to the rotation of the rollers, or with respect to the movement of material therealong, which materially increases the amount of power required for passing material through the furnace.

It is therefore an object of the present invention to provide means for lubricating the rollers and bearings for a roller hearth within the heating chamber of a heating or heat treating furnace.

It is a further object of the present invention to provide means for reducing the cost of upkeep of and repairs on the roller hearth of a heating or heat treating furnace.

Similarly, it is an object of the present invention to provide means for reducing the power required to pass material to be heat treated through a heating or heat treating furnace on skid trays or the like.

Moreover, it is an object of the present invention to provide means operative by and upon the movement of material into a furnace for lubricating relatively movable parts within a heating chamber of a heating or heat treatment furnace.

I have discovered that the bearings of rollers of a roller hearth within a heating chamber of a furnace may be satisfactorily lubricated if a small amount of graphite or the like is applied to the same, more or less continuously, or at very frequent intervals; and I have further discovered that graphite or the like may be so supplied to the bearings of such rollers by applying graphite outside of the furnace to the grooves of trays or the like which ride on the rollers, which graphite drops onto the rollers and the bearings therefor within the furnace as the trays move along the rollers within the furnace heating chamber.

Therefore, it is an object of the present invention to provide means for supplying graphite or the like to the rollers and bearings therefor of a roller hearth furnace within the heating chamber thereof through the medium of trays or the like moved along the roller hearth.

These and other objects may be obtained by the constructions, apparatus, parts, improvements, methods, operations and combinations which comprise the present invention; the nature of which is set forth in the following general statement; preferred embodiments of which, together with their mode of operation are set forth in the following description; and which are particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

In general terms, the invention includes in combination with a roller hearth furnace having a heating chamber and having a roller hearth including rollers and bearings therefor extending through the heating chamber from a point outside of the furnace, trays having track portions riding on said rollers for passing material through the furnace, and means outside of said furnace engageable with said tray tracks for applying lubricant such as graphite to the tray tracks whereby the lubricant is picked up outside of the furnace by the tray tracks and is transferred to the rollers and drops onto the bearings for the rollers within the furnace heating chamber to lubricate the same.

In the drawings,

Figure 1 is a side elevation of a furnace having a roller hearth provided with the improved lubrication construction;

Fig. 2 is an end view of the loading table end of the roller hearth shown in Fig. 1;

Fig. 3 is an enlarged fragmentary side elevation illustrating the lubrication construction shown in Fig. 1;

Fig. 4 is a fragmentary cross sectional view taken on the line 4—4, Fig. 3;

Fig. 5 is a cross sectional view taken on the line 5—5, Fig. 4;

Fig. 6 is a cross sectional view through a hearth roller within the furnace taken as on the line 6—6, Fig. 1; and

Fig. 7 is a view similar to Fig. 3, showing a modified form of construction.

Similar numerals refer to similar parts throughout the various figures of the drawings.

A heating or heat treatment furnace is indicated generally at 8 in Fig. 1 and the same includes walls forming a heating chamber indicated generally at 9. As shown, the furnace is provided with a roller hearth, indicated generally at 10 extending through the heating chamber 9 from a loading table or station 11 to an unloading table or station 12.

The roller hearth 10 includes spaced roller rail members 13 (Fig. 2), each of which preferably includes spaced members 14 having aligned preferably U-shaped bearing pocket members 15 in which are journaled the pintles or shafts 16 of rollers 17.

Trays 18 of the usual size, shape and construction for supporting material 19 to be passed through the heating chamber of the furnace 8 are preferably provided with spaced pairs of ribs 20 forming tray tracks 21, which ride on rollers 17. Any suitable means (not shown) is provided for pushing or moving the trays through the furnace along the roller hearth.

Roller rail members 13 are interrupted, as indicated generally at 22 in Figs. 1 and 3, at the loading table portion thereof; the interrupted ends of the roller rail members 13 being supported preferably by cross members 23.

The improved lubricating means may include a hopper housing 24 provided with spaced ears 25 carrying shaft or pivot 26. The pivot 26 is rotatably supported at 27 at an interrupted end of one of the roller rails 13, as best shown in Fig. 3; and the forward end of housing 24 is yieldingly supported by spring 28 and spring retainers 29 and 29' on one of the cross members 23. The housing structure 24 and mounting therefor has been described in Fig. 3 with reference to the right hand roller rail of Fig. 2, but it is to be understood that the same is duplicated on the left hand roller rail 13 of Fig. 2.

Housing 24 is provided with spaced bearings 30 in which shaft 31 is journaled; and a fabric wheel or brush 32 is mounted on shaft 31 intermediate bearings 30 so that the lower portion of wheel 32 moves through the trough portion of housing 24 which may be filled with a desired lubricant such as flake graphite 33 or flake mica or a suspension of graphite in oil.

As the tray 18 is passed along roller rail members 13 at the loading station 11 outside of the furnace, spring 28 maintains wheels 32 in contact with tray tracks 21 whereby movement of the trays causes rotation of wheels 32 which carry lubricant 33 from the hopper housing 24 to and transfer the same to the tray tracks.

Most of the lubricant thus transferred to the tray tracks adheres thereto until the tray tracks pass over the various rollers 17 within the furnace heating chamber when contact between rollers 17 and tray tracks 21 transfers some of the lubricant to rollers 21 and causes other portions of the lubricant such as the flake graphite or flake mica to drop onto the pintles or shafts 16 of rollers 17 or onto bearings 15 to lubricate the same.

If the lubricant is a suspension of flake graphite in oil, the oil will tend to increase the amount of graphite which will adhere to the tray tracks as the trays pass across the lubricating devices at the loading table. However, as the trays pass through the heating chamber, the oil will tend to quickly vaporize and leave the graphite adhering to the tray tracks whereupon the same will be rubbed or dislodged from and transferred from the tray tracks to the rollers 17 and bearings therefor within the furnace heating chamber 9.

Only a very small amount of lubricant is required, if the same is supplied repeatedly, in order to prevent the bearings for the rollers 17 within the heating chamber from sticking or seizing; and the present improvements in providing means outside the furnace for supplying lubricant to the rollers inside the furnace repeatedly or at frequent intervals overcomes the difficulties which have been experienced in the operation and upkeep of roller hearth furnaces.

It is to be observed that the operation of the lubricating device is initiated by movement of material through the furnace and that the lubricant is supplied to the bearings and rollers within the furnace through the medium of the trays that are moved along the roller hearth from a source of lubricant located outside of the furnace.

Referring to Fig. 7, a modified form of lubricating means is shown therein, which may include a housing 40 supported at 41 between the interrupted ends 42 of roller rail members 13. A graphite block or plug 43 is movably mounted in the housing 40 and adjustably, yieldably pressed upward by spring 44 and adjusting screw 45 so as to engage and apply lubricant to the tracks on the underside of tray 18.

Accordingly, the present invention provides means for lubricating the rollers and bearings for a roller hearth within the heating chamber of a heating or heat treating furnace, provides means for reducing the power required to pass material through such a furnace, and thus reduces the cost of operation, upkeep and repairs on a roller hearth heat treating furnace.

By increasing the width of the graphite applicator wheel 32 and the hopper housing 24 therefor, so that the same extend throughout the width of the conveyor, the improved construction may be used in connection with a driven-roll roller hearth furnace to apply graphite lubricant to the under surface of sheet or strip material passing through a furnace on such a roller hearth.

Thus, some of the graphite on the underside of the sheet or strip material will be transferred to the hearth rolls within the furnace so that the contacting moving hearth roll and sheet or strip material surfaces within the furnace are lubricated, which avoids the formation of scratches and the like on the sheet or strip surfaces as the same are passed through the furnace.

Having now described the features of the invention, the construction, manufacture and use of preferred forms of the same, and the advantages and results obtained by the improved construction; the new and useful parts, elements, combinations, constructions and devices, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. In a heating furnace having a heating chamber and a roller hearth extending from a point outside of the furnace through the heating chamber, the hearth including rollers and bearings for the rollers within the furnace, material supporting trays having tracks movable along said rollers, and means outside of said furnace engageable with said tray tracks for applying lubricant thereto, whereby when said trays move over rollers in said furnace, the lubricant is dislodged from the tray tracks by the rollers and drops to the bearings within the furnace to lubricate the same.

2. In a heating furnace, a heating chamber, a roller hearth including rollers and bearings for the rollers within the heating chamber, material supporting means having tracks movable along said rollers, a graphite container outside of said furnace, and means for transferring graphite to said tracks outside of said furnace whereby when the material supporting means moves over rollers in the furnace, the graphite drops onto the bearings within the furnace to lubricate the same.

3. In a heating furnace having a heating chamber, hearth means extending from a point outside of the furnace through the heating chamber, material supporting trays having tracks movable along said hearth means, means outside of said furnace engageable with said tray tracks for supplying lubricant thereto, whereby when said trays move through the furnace on said hearth means, relative movement between the trays and hearth means dislodges the lubricant from the tray tracks to lubricate the hearth means.

4. In a heating furnace having a roller hearth extending through the heating chamber thereof, material supporting trays having tracks movable along said roller hearth, and means outside of said furnace for applying lubricant to the tray tracks for lubricating the roller hearth within the heating chamber, including a lubricant reservoir, and wheeled means running in the reservoir and contacting with tray tracks thereabove, said wheeled means being rotated for transferring lubricant from the reservoir to the tray tracks by movement of the trays.

5. In a heating furnace having a roller hearth extending through the heating chamber thereof, material supporting trays having tracks movable along said roller hearth, and means outside of said furnace for applying lubricant to the tray tracks to lubricate the roller hearth within the heating chamber, including a source of lubricant, and means for transferring the lubricant from the source to the tray tracks operated by movement of the trays along the roller hearth.

6. In a heating furnace having a roller hearth extending through the heating chamber thereof, material supporting trays having tracks movable along said roller hearth, and means outside of said furnace for applying lubricant to the tray tracks to lubricate the roller hearth within the heating chamber, including a lubricant applicator, and means yieldingly urging the applicator in contact with trays moved along the roller hearth.

7. In a heating furnace having a heating chamber, roller hearth means extending from a point outside of the furnace through the heating chamber, means for moving articles through the furnace along said roller hearth, and means outside of said furnace engageable with said articles for applying lubricant thereto, whereby some of said lubricant is transferred from the articles to roller hearth parts within the furnace to lubricate contacting moving surfaces within the furnace.

8. In a heating furnace having a heating chamber, roller hearth means extending through the heating chamber, means for moving articles through the furnace along said roller hearth, means outside of said furnace for applying lubricant to the articles to lubricate contacting moving surfaces within the furnace, including a source of lubricant and means operated by movement of the articles along the roller hearth for transferring the lubricant from the source to the articles.

9. The method of lubricating contacting moving parts within the heating chamber of a heating furnace which includes the steps of applying flake graphite and the like to a surface of a moving article outside the furnace, moving such article through the furnace, and transferring some of said graphite to moving parts within the furnace by contact with said moving surface to lubricate the same.

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