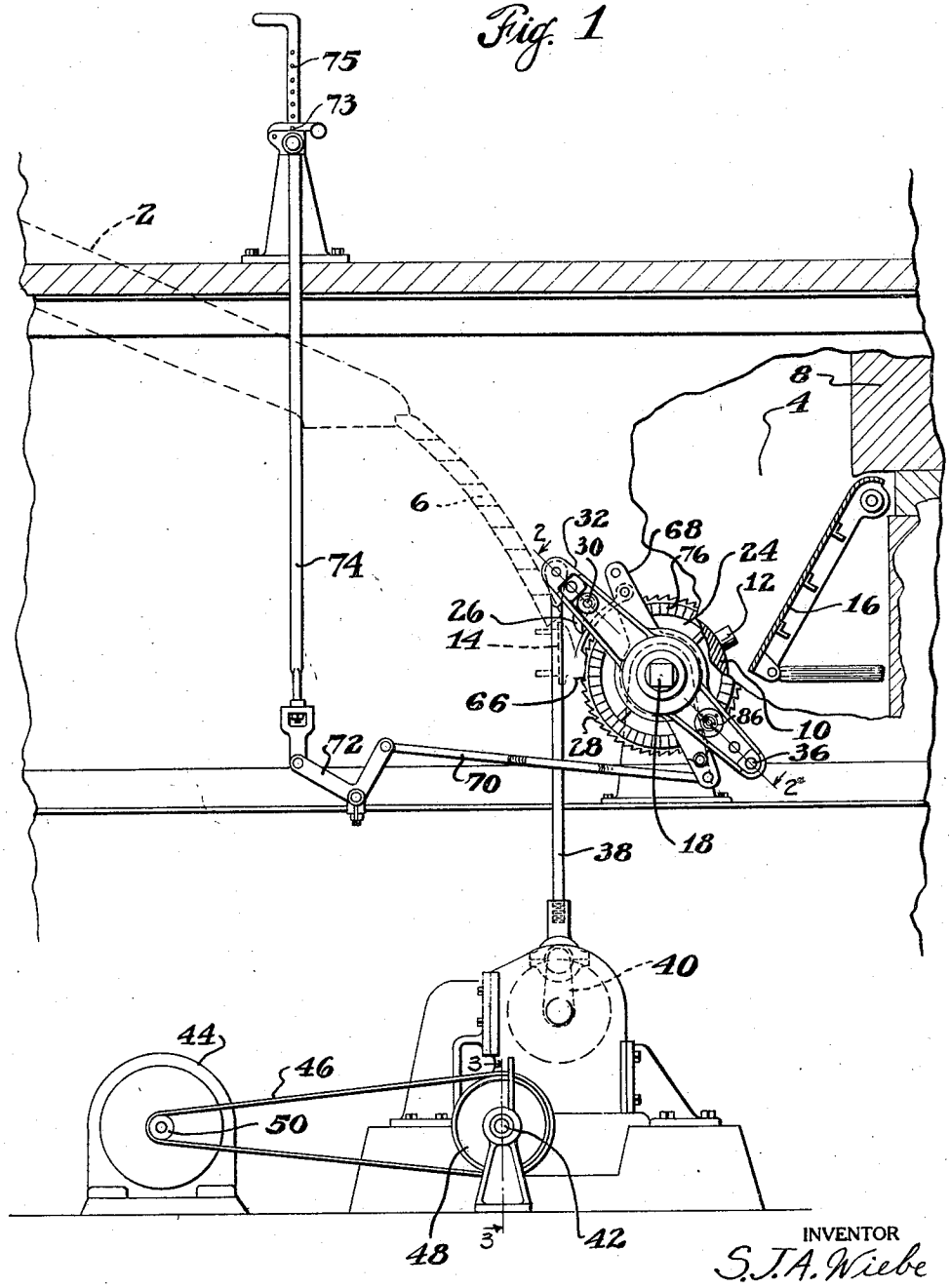
April 29, 1930. S. J. A. WIEBE 1,756,320

FURNACE

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Fig. 1



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Fig. 2

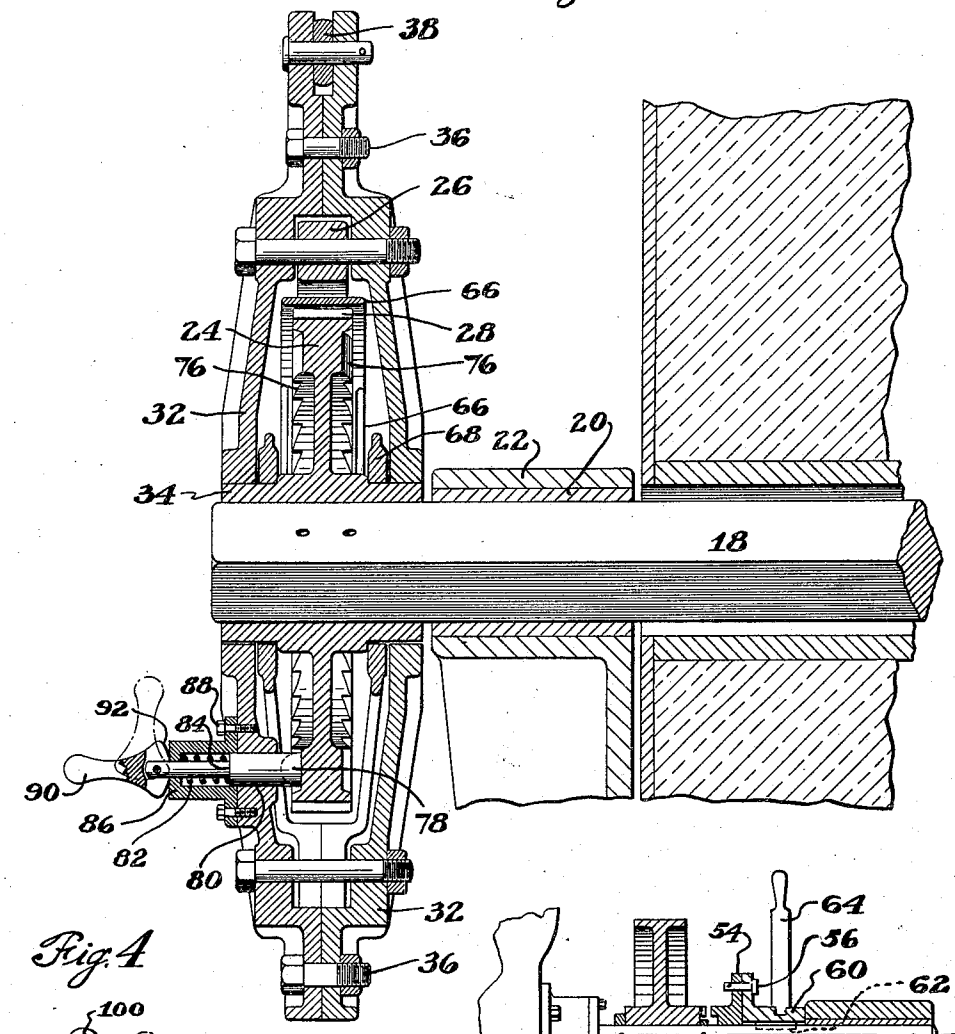
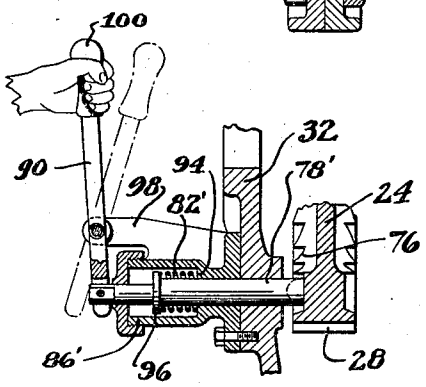


Fig. 4



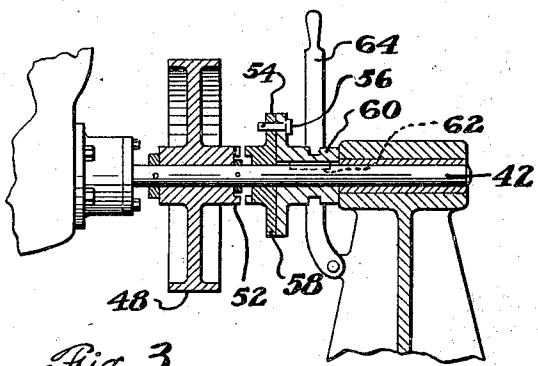


Fig. 3

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UNITED STATES PATENT OFFICE

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FURNACE

Application filed November 18, 1924. Serial No. 750,535.

My invention relates to furnaces of the type employing one or more clinker grinding rolls, and has special reference to mechanism for driving the rolls.

An object of the invention is to provide a novel and improved driving mechanism of this character.

In the operation of furnaces of the character indicated, it often happens that a piece of metal may fall down into the ash pit and obstruct the rotation of the clinker grinding roll. This metal may be a part of the stoker that has worked loose, or it may be a piece of scrap metal carried in with the coal. In order to prevent breakage when the rotation of the roll is thus obstructed, a safety device has been provided which serves to disconnect the actuating mechanism for the roll from the power driving means therefor upon an excessive strain being placed on the roll and its actuating mechanism, the safety device usually consisting of a shearing pin interposed between said actuating mechanism for the roll and said power driving means. While such shearing pin arrangement is satisfactory, it is of course necessary to remove the obstruction before the operation of the grinding roll can be resumed. Heretofore, this has been accomplished by opening the dumping apron widely and partly emptying the ash pit, and then reversing the rotation of the roll by means of a block and fall tackle which is connected to the usual ratchet pawl arm and ratchet wheel forming a part of the actuating mechanism for the roll. In order to actually catch the obstructing piece and carry it backwards so as to cause it to be discharged from the ash pit, several revolutions of the roll are sometimes necessary, which of course takes time and interferes materially with the normal operation of the furnace. Also, considerable time is lost in getting ready for this kind of work.

Accordingly, another object of the invention is to provide means which, upon the rotation of the clinker grinding roll becoming obstructed as above described, is adapted to be easily thrown into operation by the operator to effect the necessary reversal of the roll and the discharge of the obstruction in a minimum length of time.

Another object of the invention is to provide an actuating mechanism for a clinker grinding roll having provision of means which is adapted to be easily controlled by the operator to effect reversal of the roll.

With the above and other objects in view, the features of the invention consist in certain constructions, arrangements and combinations of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art.

The several features of the invention will be clearly understood from the following description and accompanying drawings, in which:

Figure 1 is a side elevation, partly in section, of the rear portion of a furnace employing a driving mechanism for the clinker grinding roll thereof embodying the features of the invention in their preferred form;

Fig. 2 is a sectional view, on an enlarged scale, taken on the line 2—2 of Fig. 1;

Fig. 3 is a detail sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 1; and

Fig. 4 is a view similar to a portion of Fig. 2 of a modified form.

The furnace illustrated in the drawings is provided with a downwardly and rearwardly inclined grate 2, and an ash pit 4 located at the rear thereof having a front wall 6 and a rear or bridge wall 8. A clinker grinding roll 10 is mounted in the lower end of the ash pit between the side walls thereof. The clinker grinding roll is provided with radially projecting teeth 12 which are adapted to cooperate with teeth on a clinker grinding plate 14 on the forward wall of the ash pit to break up the clinkers as the residue of the fuel entering the ash pit is discharged between the clinker grinding roll and plate. A forwardly and downwardly inclined apron 16 is pivotally mounted at its upper end on the rear or bridge wall 8, and is adapted to be swung back from the clinker grinding roll to permit the ashes to be dumped out of the ash pit. The clinker grinding roll is mounted on a squared shaft 18, the ends of which ex-

tend through openings in the side walls of the ash pit and are provided with bearing or supporting sleeves that are journalled in suitable bearings adjacent the outer sides of the side walls of the ash pit, the bearing sleeve and bearing for one end of the shaft being shown at 20 and 22, respectively. The driving mechanism for the clinker grinding roll comprises a ratchet wheel 24 secured on the end of the squared roll shaft 18, and a cooperating pawl 26 that is adapted to be held by gravity in engagement with ratchet teeth 28 on the periphery of the ratchet wheel. The pawl 26 is pivotally mounted on a pin or bolt 30 carried by a lever 32 which is made in two sections that are arranged at opposite sides of the wheel and pivotally mounted on the projecting end portions of the hub 34 of the wheel, the two sections of the lever being secured together near its ends by bolts 36. The lever 32 is oscillated to cause the pawl 26 to act through the ratchet wheel to impart a step by step rotary movement to the clinker grinding roll, by means of a link or rod 38 having its upper end pivotally connected with the upper end of the lever and its lower end pivotally connected with the wrist pin of a crank 40. The crank 40 is driven through suitable connections, not shown, with a driving shaft 42, which in turn is driven from a motor 44 through a belt 46 that passes over pulleys 48 and 50 mounted on the driving shaft 42 and the motor shaft, respectively. The pulley 48 is loosely mounted on the shaft 42 and is adapted to be connected so as to drive the shaft through a clutch 52. The driven member 54 of the clutch is connected with the shaft through a shearing pin 56 which extends through an aperture in a flange 58 on said driven member and an aperture in a similar flange on a clutch collar 60 that is connected with the shaft by means of a suitable key 62 so as to cause the shaft to rotate with the collar but permitting the collar to be shifted by means of a hand-lever 64 to move the driven clutch member 54 into and out of engagement with the driving clutch member carried by the driving pulley 48. With this construction, in case the rotation of the clinker grinding roll is unduly obstructed as by a piece of metal accidently falling into the ash pit, the shearing pin 56 will be sheared off, and thus the actuating mechanism for the clinker grinding roll will be disconnected from the driving pulley 48.

Mechanism is associated with the actuating mechanism for the clinker grinding roll for controlling the speed of operation of the roll, and also for rendering the driving mechanism inoperative to drive the roll. As shown, this controlling mechanism comprises a control plate 66 which rides on the peripheral teeth 28 of the ratchet wheel and has one end pivotally connected on the upper end of a lever 68 which is made in two sections so as to be arranged at opposite sides of the ratchet wheel inside of the sections of the pawl lever 32 and is pivotally mounted on the projecting end portions of the hub 34 of the ratchet wheel. The lower end of the control lever 68 is connected by a link 70 to one arm of a bell-crank 72, the other arm of which is pivotally connected with the lower end of a vertical rod 74 which is adapted to be adjusted vertically by the operator and held in adjusted position by a locking pin 73 adapted to be inserted in apertures 75 in the upper portion thereof. By suitable adjustment of the rod 74 the control plate 66 may be adjusted peripherally of the ratchet wheel to vary the effective stroke of the actuating pawl 26, and also to render the pawl 26 ineffective to drive the ratchet wheel.

In accordance with my invention means is provided whereby when the normal rotation of the roll has been obstructed, the actuating mechanism for the roll may be controlled by the operator to drive the roll in the reverse direction to the direction of normal operation thereof, so as to permit the piece of metal or other obstruction to be carried back by the roll and discharged from the ash pit between the roll and the dumping apron 16. To provide for this the outer side of the rim of the ratchet wheel 24 is provided with a series of radial teeth 76 that are adapted to be engaged by a pawl 78. This pawl 78 comprises a plunger which is mounted to slide in an aperture 80 in the outer section of the ratchet lever 32 and is pressed toward the teeth of the ratchet wheel by means of a coiled spring 82 interposed between a shoulder 84 on the plunger and the outer end of a plunger cylinder 86 which is secured by bolts 88 to the ratchet lever 32. A hand-lever 90 is pivotally mounted on the outer end or stem of the plunger 78, and has its inner end provided with a suitably shaped cam surface 92 engaging the outer end surface of the plunger cylinder 86, so that upon moving the lever 90 into the position indicated by broken lines in Fig. 2, the plunger pawl 78 may be retracted from the radial teeth 76 of the ratchet wheel, and upon moving the lever to its horizontal position as shown in full lines in said figure, the plunger pawl is adapted to be carried by its spring 82 into operative engagement with the teeth 76 of the ratchet wheel. With this construction when the rotation of the clinker grinding roll has been obstructed and the pin 56 sheared off, it is only necessary to shift the controlling plate 66 to neutral position, swing back the dumping apron 16, insert a new shearing pin 56, and then turn the hand-lever 90 to permit the plunger pawl 78 to engage the teeth of the ratchet wheel, to cause the clinker grinding roll to be rotated in a reverse direction until the piece of metal or other obstruction has been discharged thereby from the ash pit. When this has been accomplished, the plunger pawl 78 may be

retracted from the ratchet wheel, the dumping apron 16 returned to its effective position and the control plate 66 adjusted to permit effective operation of the actuating pawl 26 on the teeth of the ratchet wheel, to resume the normal operation of the grinding roll.

In cases of the wider furnaces, it is customary to make the clinker crushing roll in two sections, a shaft being provided for each section of the roll and a separate driving mechanism for each shaft being associated with the outer end thereof. Accordingly, as illustrated in the drawings, the ratchet wheel 24 is provided with suitably arranged ratchet teeth 76 on both sides thereof so that the ratchet wheels on the shafts of the two sections of the roll are interchangeable.

In addition to removing obstructions from the grinding roll, another advantage of the provision for reversing the rotation of roll is to permit the contents of the ash-pit to be quickly and completely dumped out when the dumping apron 16 is opened.

In the modified construction illustrated in Fig. 4, the plunger pawl, which is shown at 78′, is pressed outwardly away from the teeth of the ratchet wheel by means of a spring 82′ coiled about the plunger and interposed between a shoulder 94 on the plunger cylinder 86′ and a shoulder 96 on the plunger pawl. The plunger pawl is adapted to be held in operative engagement with the teeth of the ratchet wheel against the tension of the spring 82′, by means of a hand-operated lever 90′ having its lower end pivotally connected with the outer end of the plunger pawl, and pivoted a distance from its lower end on a bracket 98 projecting from the plunger cylinder, the upper end of the lever being provided with a handle 100. With this construction the operator by grasping the handle 100 may hold the plunger pawl in operative engagement with the teeth of the ratchet wheel a sufficient length of time to effect the desired reversal of rotation of the clinker grinding roll, and immediately upon releasing the handle, the spring 82′ will retract the plunger pawl and thus permit the normal operation of the clinker grinding roll to be resumed.

As will be evident to those skilled in the art, my invention permits various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A furnace having, in combination, a clinker grinding roll, a carrier lever adapted to be oscillated about an axis arranged in alinement with the axis of the roll, means for oscillating said lever, an actuating pawl carried by the lever and suitable connections adapted to rotate the roll in one direction, a second pawl carried by said lever and suitable connections for rotating the roll in the opposite direction, and manually operable means for selectively rendering said pawls operative and inoperative to drive the roll at the will of the operator and for varying the extent of the effective movements of at least one of said pawls.

2. A furnace having, in combination, a clinker grinding roll, and driving mechanism therefor comprising a ratchet wheel, controllable means for actuating the ratchet wheel to drive the roll in one direction to effect the normal operation thereof, and controllable means comprising a pawl adapted to be set by the operator when said first mentioned means is rendered inoperative to drive the roll in the reverse direction to the direction of the normal operation thereof, said second mentioned means comprising a plunger adapted to be moved into and out of engagement with said ratchet wheel, a spring for pressing the plunger toward operative engagement with the wheel, and means connected with the outer end of the plunger for retracting the plunger against the tension of its spring and for holding the plunger in retracted position.

3. A furnace having, in combination, a clinker grinding roll, and driving mechanism therefor comprising a ratchet wheel, a lever mounted for oscillating movement about the axis of said wheel, means for thus actuating the lever, a pawl carried by the lever adapted to cooperate with the ratchet wheel to drive the roll in one direction upon said actuation of the lever, controllable means for rendering said pawl operative and inoperative, a second pawl carried by said lever adapted to cooperate with the ratchet wheel to drive the roll in the reverse direction after said first mentioned pawl has been rendered inoperative, and controllable means for rendering said second mentioned pawl operative and inoperative.

4. A furnace having, in combination, a clinker grinding roll, a carrier lever adapted to be oscillated about an axis arranged in alinement with the axis of the roll, means for oscillating said lever, an actuating pawl carried by the lever and suitable connections adapted to rotate the roll in one direction, a second pawl carried by said lever and suitable connections for rotating the roll in the opposite direction, and means operable by the operator at a substantial distance for varying the extent of the effective movements of at least one of said pawls during the operation of the grinding roll and for rendering it operative and inoperative to drive the roll at the will of the operator, and means for rendering the other pawl operative and inoperative to drive the grinding roll.

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