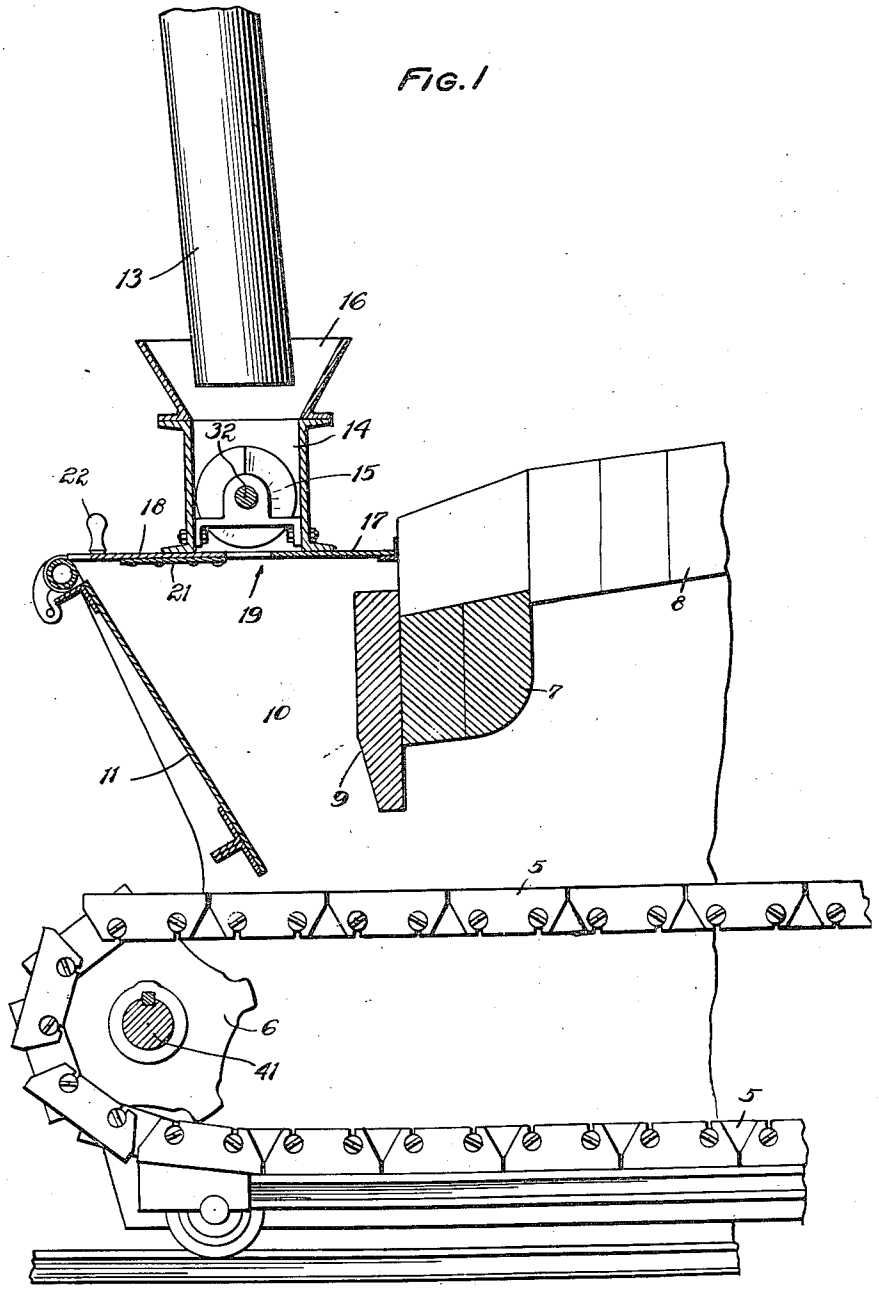
April 22 , 1924. 1,491,401

J. W. HIMMELSBACH

COAL SPREADER

Filed May 31 . 1923 2 Sheets-Sheet 1

FIG. 1



Inventor
John W. Himmelsbach
By Lindabl, Parker & Eadson
Attys

April 22, 1924. 1,491,401

J. W. HIMMELSBACH

COAL SPREADER

Filed May 31, 1923 2 Sheets-Sheet 2

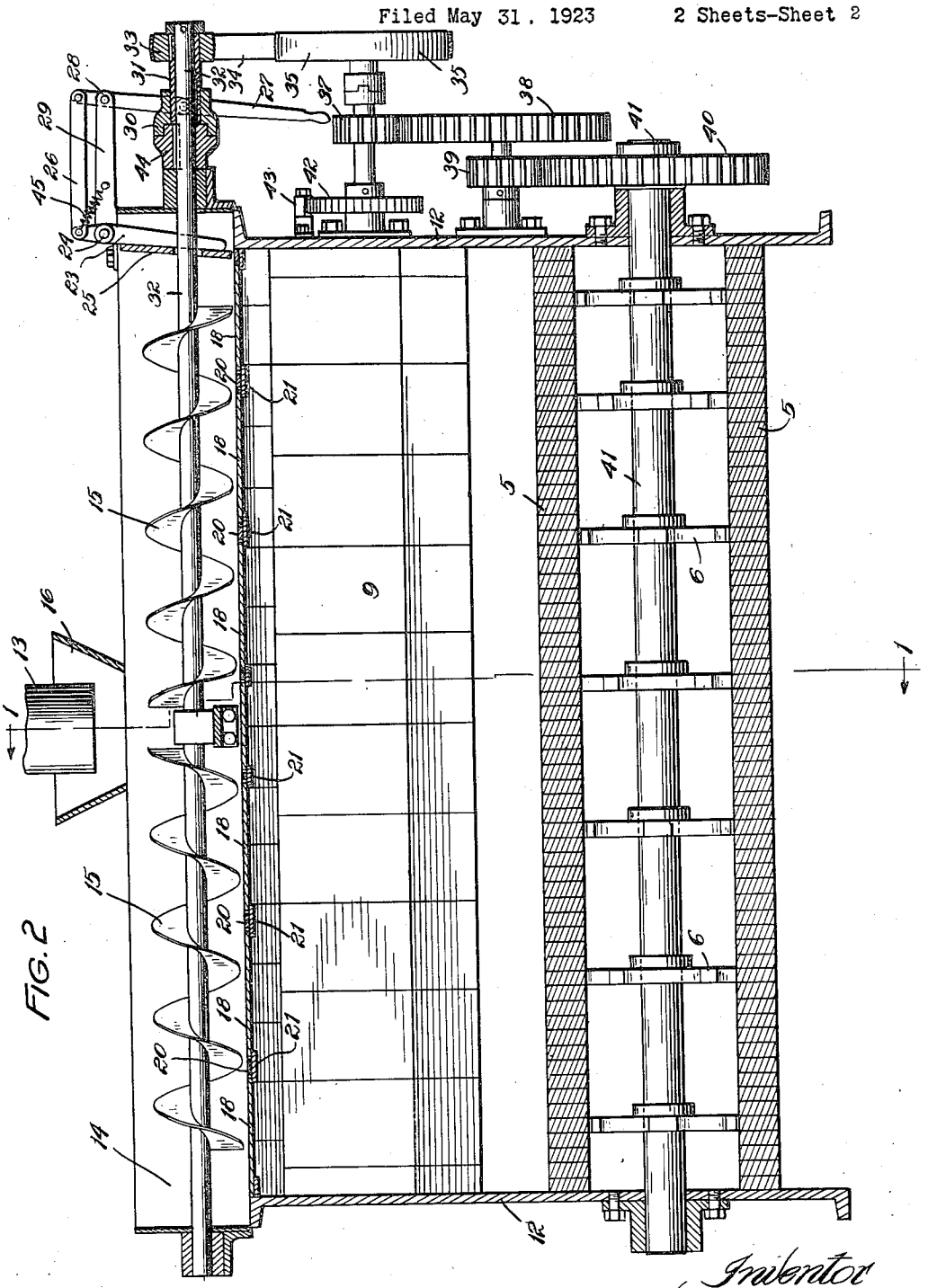


FIG. 2

Inventor
John W. Himmelsbach
By Blinderbf, Parker & Carlson.
Attys

Patented Apr. 22, 1924. 1,491,401

UNITED STATES PATENT OFFICE.

JOHN W. HIMMELSBACH, OF CHICAGO, ILLINOIS.

COAL SPREADER.

Application filed May 31, 1923. Serial No. 642,452.

To all whom it may concern:

Be it known that I, JOHN W. HIMMELSBACH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Coal Spreader, of which the following is a specification.

This invention relates generally to the art of mechanical stokers and more particularly to an improved mechanism for spreading and delivering coal to a mechanical stoker. The invention is herein shown as applied to a stoker of the type having an endless chain grate by which the coal is carried into the furnace.

In the use of this type of grate it is customary to provide a hopper overlying the projecting front end of the chain, which hopper is supplied with coal through a conduit or spout either fixed or swinging, leading from overhead coal bunkers and discharging into the center of the stoker hopper. Actual experience has proven that this method of supply is unsatisfactory because it results in the major portion of the coal being delivered to the center of the grate and the sides of the grate having an insufficient supply. Furthermore, the finer coal packs and remains at the center of the stoker hopper while the coarser rolls toward the ends, and the entire weight of the column of coal in the spout is borne upon the pile of finer coal at the center which results in packing this central coal while the side edges remain loose.

The packing of the fuel under the spout or spouts and the separating of the coarse and fine coal results in spots or sections formed on the grate surface which offer unequal resistance to the passage of air through the fuel bed. A sufficient quantity of air must be introduced into the furnace through the fuel bed to most efficiently combine with the gases of combustion. If the air supply is regulated to give a proper amount through the spots or sections offering the higher resistance to the passage of air, the result will be an excess of air through the spots or sections offering a lesser resistance. This amount of excess air is reflected in lowered efficiency of combustion. If the air supply is regulated to give a proper amount through the spots or sections offering the lesser resistance to the passage of air, the result will be incomplete combustion of the spots or sections offering a higher resistance. This incomplete combustion is reflected in an excess amount of combustible matter in the ash pit.

The general object of the present invention is to provide a power-driven spreading mechanism by which coal delivered from the spout will be thoroughly mixed in respect to coarse and fine, or separation of the course and fine coal will be prevented, and the coal will be spread out into a wide, thin and substantially unbroken stream for delivery to the surface of the grate or other receiving means of the stoker, with the result that a fuel bed will be provided which will offer a uniform resistance to the passage of air throughout its entire area, thereby increasing efficiency of combustion.

An ancillary object is to provide a means to relieve the fuel bed of all pressure due to the weight of the column of coal in the spout and overhead bunker which will result in equal pressure throughout so that no section of the fuel bed is of greater density than another, thereby maintaining an even and more efficient fire in the furnace and avoiding the disadvantages above noted.

Another object is to provide means for regulating the amounts of coal delivered to different sections of the grate, to the end that a more even distribution may be effected.

A further object is to provide means by which the spreading mechanism will be stopped automatically in case it is feeding too rapidly or the coal becomes clogged in the spreader trough, also to restart the feed automatically when the cause of the stop has been eliminated.

Another object is to provide a coal spreader in the form of a unitary attachment which may be easily applied to existing furnaces.

Further objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical section in the plane of line 1—1 of Fig. 2 running from front to rear through the forward part of the furnace, showing my improved spreading mechanism applied thereto.

Fig. 2 is a vertical section in a plane extending transversely to the chain grate showing the spreading mechanism in longitudinal or axial section.

The stoker herein shown comprises the usual endless travelling grate 5 passing around sprockets 6 and beneath the fur-

nace arches 7 and 8. In front of the arch 7 is the usual fuel gate 9 which is vertically adjustable to vary the space between its lower edge and the upper lead of the chain 5 thereby controlling the thickness of the layer of coal carried into the furnace by the grate. The means for raising and lowering the fuel gate is not herein shown since it forms no part of the present invention.

As seen in Fig. 1, the forward end of the chain grate 5 projects beyond the front of the furnace and over this projecting end is a hopper 10 extending the full width of the grate. In the present instance the fuel gate 9 forms the rear wall of the hopper, the front of the hopper being formed by a plate 11 and the ends by the side frames 12 in which the chain grate mechanism is mounted.

The main supply of coal for filling the hopper 10 is contained in overhead coal bunkers from which a spout or chute 13 leads downwardly and overlies the hopper 10. My improved spreading mechanism receives the coal from this spout, spreads the coal and delivers it to the hopper 10. The spreading mechanism, in the exemplary form shown, comprises a box or trough 14 which overlies and extends longitudinally of the hopper 10 and contains a screw conveyor unit 15. The spout 13 delivers coal to the center of the screw conveyor unit 15 and the screw conveyor unit comprises two sections having right and left hand threads respectively to carry the coal in opposite directions away from the middle of the trough. 16 represents a small hopper mounted on the trough 14 to receive the coal from the spout 13 and to insure delivery of the coal to the middle point of the screw conveyor unit 15.

In the present instance the spreader trough comprises a pair of channel iron sections having their ends mounted on the head frames 12 of the grate structure and the bottom of the trough is formed by a plate 17 and by a series of adjustable closures 18 in the form of sliding plate sections, said plate 17 and closures 18 providing between them a long narrow substantially continuous opening through which the coal is discharged in a substantially unbroken wide thin stream. By means of the closures 18 the discharge of coal from the spreading trough into the stoker hopper may be controlled and the sizes of the respective discharge openings along the trough may be independently varied to effect a more even distribution of coal throughout the length of the stoker hopper 10.

In the present exemplary form shown in the drawings the plate 17 is continuous or unbroken from its rear edge, that is, adjacent to the arch 7, up to the point indicated by reference numeral 19, and a plurality of narrow strips 20 project from said point forwardly. To the lower edges of these strips are fastened wider strips 21 which form supports and guides for the slide plates 18. Each of the slide plates may be provided with a suitable handle 22 so that they may be adjusted manually independently of each other.

It may sometimes happen that the screw conveyor unit 15 is delivering coal to the stoker hopper 10 faster than the chain grate 5 is carrying coal into the furnace, in which case the spreader trough may clog after the stoker hopper 10 has been completely filled. To prevent damage in such contingency I have provided an automatic throw-out mechanism operated by the pressure of the coal in the spreader trough for stopping the rotation of the screw conveyor unit. This mechanism in the exemplary form shown in the drawings comprises a lever 23 pivoted at 24 on the trough and carrying a plate 25 which extends transversely across the trough at one end. The upper end of this lever is connected by a link 26 to the upper end of a clutch shifting lever 27 which is pivoted at 28 on a bracket 29. This clutch lever engages a slidable clutch collar 30 which is splined upon a sleeve 31 surrounding one end of the screw shaft 32. This sleeve carries a fixed pulley 33 driven by a belt 34 from a pulley 35 which is fixed on an extension of a shaft 36 that forms a part of the mechanism for driving the chain grate 5. Said mechanism comprises a train of gears 37, 38, 39, 40 connecting the shaft 36 to a shaft 41 on which the sprockets 6 for the chain grate are mounted, and a ratchet wheel 42 engaged by a reciprocatory pawl 43 which is usually driven from an overhead eccentric, not herein shown.

A stationary clutch collar 44 is fixed on the screw shaft 32 and is arranged to be engaged by the slidable clutch collar 30 to drive the screw. A spring 45 tends to hold the clutch lever in position to maintain the two clutch collars in engagement. When coal accumulates in the spreader trough sufficient to cause pressure upon the plate 25 the lever 27 will be swung to separate the clutch collars and stop the screw conveyor unit. When the pressure is relieved the spring will again engage the clutch collars and start the screw conveyor unit.

One of the important features of my spreading mechanism is that it is capable of being manufactured and sold as a separate unit ready to be applied to existing stoker installations. Chain grate stokers usually embody the head frames 12 and a hopper such as 10 extending between them. Heretofore the spout 13 has delivered the coal directly into stoker hopper 10. It will be seen that my spreading mechanism is so constructed that it may be set upon the head

frames 12 beneath the spout 13 and the only change in the existing structure which it is necessary to make is to provide a connection to the stoker operating mechanism as a source of power.

The coal spreader acts to distribute the coarser as well as the finer or dust coal equally and evenly over the entire width of the grate and inasmuch as the weight of the column of coal in the spout 13 is borne by the spreader and the coal is dropped into the stoker hopper 10 through a substantially continuous long narrow opening comprising sections which are capable of regulation as to size, there will be no tendency for the coal to pack in the stoker hopper 10 at one zone more than another. I am thereby enabled to maintain a layer of fuel passing beneath the fuel gate 9 which is uniform as to thickness, density, and mixture of coarse and fine coal, with a result that a higher average efficiency of combustion is maintained.

Inasmuch as the coal spreader is driven from the means which advances the chain grate, the speed of the screw conveyor unit may be properly related to that of the grate so that the stoker hopper 10 will normally be kept approximately full at any rate of travel of the grate. The extent to which the slide-gates 18 are opened depends upon the height of the fuel gate 9 of the furnace and the physical properties of the fuel. If the fuel gate be raised higher than usual to permit a thicker layer of coal to be carried into the furnace, then the slides 18 will be opened wider to permit coal to be fed faster into the stoker hopper 10 so as to compensate for the increased rate of discharge from said hopper. It will therefore be seen that the chain grate speed, the screw conveyor unit speed, the fuel gate height, and the extent of opening of the slides 18, are all correlated and cooperate toward the constant maintenance of efficient combustion of coal in the furnace.

While I have herein shown only one exemplary embodiment of my invention I recognize that it is susceptible of various modifications and variations and I therefore do not limit myself to the construction herein disclosed but aim to cover equivalents and alternatives in the appended claims.

I claim as my invention:

1. A coal spreading device of the character described, adapted to be mounted above a stoker hopper with its mid portion underlying the coal delivering spout for said hopper, said device comprising a long, narrow trough co-extensive in length with said hopper and having at its bottom a substantially continuous opening extending the full length thereof, and a power-driven spreader comprising two sections arranged to move the coal away from the middle of said trough in opposite directions and to discharge the coal by gravity in a wide, thin stream though the bottom of said trough into said hopper, said device as a whole receiving the pressure due to the coal in said spout, and acting to spread the coarse and fine coal uniformly over the entire length of said hopper, whereby packing of the coal in the middle of the hopper is prevented and uniform mixture and density of the coal delivered to the hopper is attained.

2. A coal spreading device for delivering coal to a mechanical stoker, comprising in combination a trough having at its bottom a substantially continuous long, narrow, discharge opening, said trough being adapted to be mounted above a receiving means of the stoker and being arranged to receive coal from a source of supply, and a driven speader unit acting to move the coal longitudinally in said trough from the source of supply and prevent separation of the coarse and fine coal and discharge the coal by gravity in a wide, thin, unbroken stream through the bottom opening in said trough.

3. A coal spreading device for delivering coal to a mechanical stoker, arranged to be mounted above the receiving means of the stoker and to underlie the overhanging coal delivering spout for such hopper, said device comprising in combination a trough having a substantially continuous long, narrow opening at its bottom, a screw for moving coal from said spout longitudinally along said trough and discharging the coal by gravity in a wide, thin stream through said opening, and means for varying the size of said opening to vary the thickness of the coal stream being discharged.

4. A coal spreading device for delivering coal to a mechanical stoker, arranged to be mounted above the receiving means of said stoker, said device comprising in combination a long, narrow trough having a substantially continuous long, narrow opening in its bottom, means for delivering a constant stream of coal into the middle of said trough, and a spreader unit comprising two screw sections in opposite end portions of said trough, arranged to move the coal in opposite directions away from the middle of the trough, to prevent separation of the coarse and fine coal, and to deliver the coal by gravity in a substantially unbroken, wide, thin stream into said stoker receiving means.

5. A device of the character described having, in combination, a trough, a screw conveyor unit therein, means for driving said screw including a clutch, and means comprising a movable abutment in said trough constituting a false end wall of said trough and arranged to be moved by engagement of the material in the trough therewith for automatically disengaging said clutch.

6. A device of the character described

comprising a trough, a screw conveyor unit therein having a shaft extending through one end of the trough, means for driving said shaft including a clutch mounted outside said trough, and a movable abutment located within the end of said trough adjacent to said clutch, and connected to said clutch to release the clutch when pressure of the material in the trough moves said abutment.

7. A device of the character described comprising a trough, a screw conveyor unit therein having a shaft extending through one end of the trough, means for driving said shaft including a clutch mounted outside said trough, a pivoted abutment located within the end of said trough adjacent said clutch, a pivoted clutch-operating lever, a link connecting said abutment to said lever to release the clutch when pressure of material in the trough moves said abutment, and a spring acting to re-engage said clutch automatically when the pressure on said abutment has been relieved.

8. A device of the character described comprising, in combination, a container, a feeding conveyor therein, means including a disengageable device for driving said conveyor, and means automatically operable when said container becomes clogged for disengaging said driving means and acting to automatically re-engage said driving means when the cause of the disengagement has been eliminated, said automatically operable means comprising a false end wall located within the container and operable by pressure of the material moved by said conveyor.

In testimony whereof, I have hereunto affixed my signature.

JOHN W. HIMMELSBACH.