Jan. 5, 1932. R. L. BEERS 1,839,826

HOPPER CONSTRUCTION FOR STOKERS

Filed Nov. 4, 1929 2 Sheets-Sheet 1

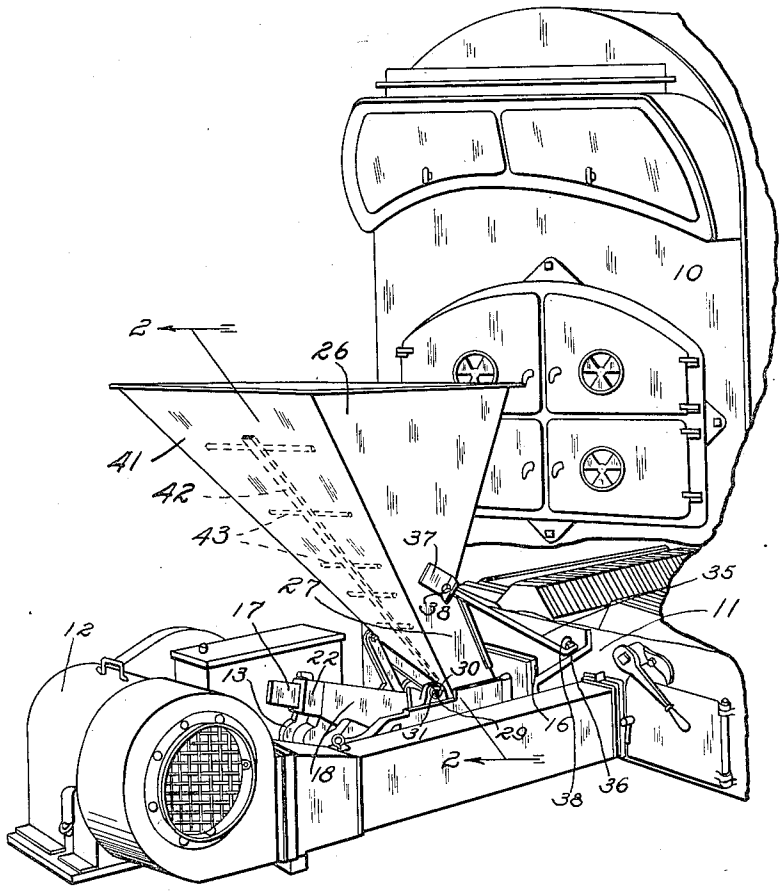


FIG. 1.

INVENTOR

Royce L. Beers

BY

Whittemore Hulbert & Whittemore & Belknap

ATTORNEYS

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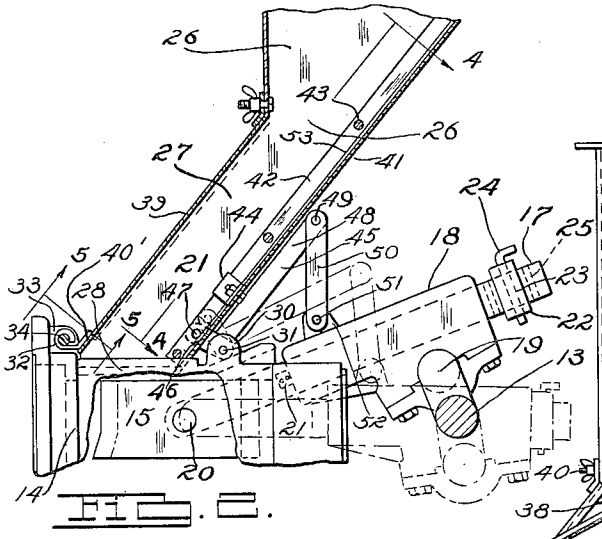


Fig. 2.

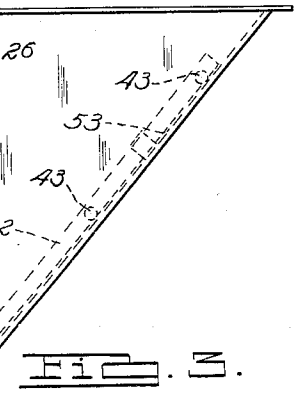


Fig. 3.

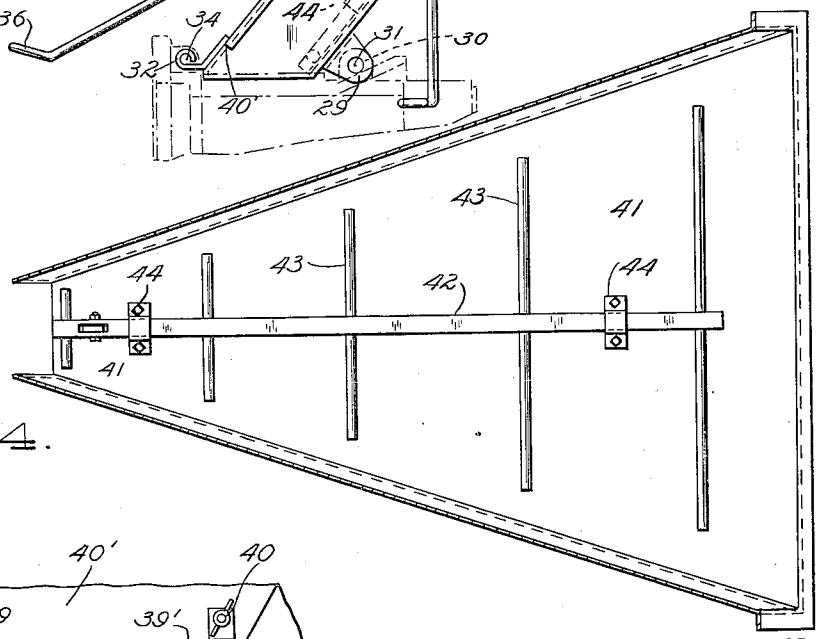


Fig. 4.

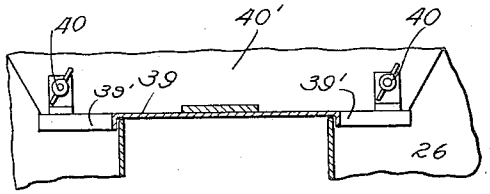


Fig. 5.

INVENTOR

Royce L. Beers

BY

Whittemore Hulbert Whittemore & Belknap

ATTORNEYS

Patented Jan. 5, 1932

1,839,826

UNITED STATES PATENT OFFICE

ROYCE L. BEERS, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT STOKER COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

HOPPER CONSTRUCTION FOR STOKERS

Application filed November 4, 1929. Serial No. 404,747.

This invention relates to stokers, and more especially to a construction and arrangement of parts tending to simplify, render more efficient and improve generally devices of this character.

In the type of stokers, to which this invention pertains, it is particularly desirable and advantageous to have the fuel hopper discharge into the ram casing at a point in close proximity to the front wall of the furnace. However, with such an arrangement difficulty has heretofore been experienced in providing sufficient clearance for the boiler furnace doors. To overcome this difficulty the fuel hopper is cut back or spaced from the furnace wall to provide the desired clearance and is connected to the ram casing by means of a relatively restricted throat portion.

While such a construction and arrangement of parts affords sufficient clearance between the fuel hopper and the front wall of the furnace, difficulty is sometimes experienced in obtaining a constant uniform feed of the fuel through the relatively restricted front portion essential with an arrangement of this nature. To this end the present invention contemplates as another feature of importance thereof the provision of agitating means arranged within the fuel hopper and extending into the throat portion thereof and acting to feed the fuel uniformly and constantly to the ram casing during the operation of the stoker.

Another important object of the invention is to provide means for operating the agitator from a part of the stoker mechanism, for instance, the sliding bearing of the lost motion ram actuating mechanism, whereby the agitator will be operated at all times with a maximum stroke irrespective of the length of the stroke of the ram.

The present construction also contemplates as an important feature thereof the operation of the agitator directly from the crank bearing or connecting rod as distinguished from heretofore known practices whereby compactness and simplicity of construction is obtained.

Another advantageous structural feature of the invention is the provision of a removable plate over the throat section of the hopper whereby this portion thereof is rendered readily accessible.

The present invention contemplates further novel details of construction of practical commercial advantage in this art.

The several objects, advantages and novel details of construction of this invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein

Figure 1 is a fragmentary perspective view of an automatic stoker furnace constructed in accordance with my invention;

Figure 2 is an enlarged fragmentary vertical sectional view taken substantially on a plane indicated by line 2—2 in Figure 1;

Figure 3 is an enlarged elevational view of the fuel hopper detached;

Figure 4 is a detailed sectional view through the hopper taken on a plane indicated by line 4—4 in Figure 2; and

Figure 5 is a fragmentary detailed sectional view taken substantially on the plane indicated by line 5—5 in Figure 2.

Referring now more particularly to the drawings wherein like reference characters indicate like parts, and particularly Figure 1, it will be noted that there is fragmentarily illustrated a furnace 10 provided with a retort having a portion 11 extending forwardly of the front wall of the furnace. The reference character 12 indicates a motor which drives a crank shaft 13 through suitable reduction gearing. The reference character 14 indicates generally the ram casing for the fuel feeding ram 15 (see Figure 2). The adjacent end of the ram casing 14 is connected to the flanged throat portion 16 of the retort.

The ram 15 is reciprocated by means of a connecting or pitman rod 17 on which is slidably arranged a sleeve-like bearing member 18, the latter being connected to the crank portion 19 of the crank shaft 13, and partaking of the maximum throw thereof at all times. The connecting rod is pivotally connected to the ram, as indicated at 20. The slidable sleeve-like member engages with one

of its ends against a fixed abutment 21, carried by the connecting rod and at its other end against an adjustable abutment 22, the latter being here shown in the form of a sleeve 23, which may be adjustably secured to the connecting rod by means of a pin 24 passed through the abutment sleeve 22 and any one of a plurality of apertures 25 formed in the connecting rod. Thus an adjustable lost motion connection is provided for driving the fuel feeding ram 15.

The fuel hopper 26 is cut back or positioned at a point sufficiently removed from the front wall of the furnace to provide ample clearance for the boiler furnace doors. The hopper proper has connected thereto or is formed with a relatively restricted neck-like or throat portion 27, which communicates with the ram casing 14 by means of an aperture or opening 28 in the top wall thereof. The arrangement is such that while the hopper is spaced sufficiently from the front wall of the furnace to provide the necessary clearance for the doors, the contents of the hopper are discharged into the ram casing at a point closely adjacent the front wall of the furnace. It will be obvious that the fuel deposited in the ram casing is then fed by means of the ram into the retort.

The wall of the hopper most remote from the front wall of the furnace is provided with a pair of spaced apertured ears 29, with which a pair of ears 30, formed on the ram casing cooperate. A pin or bolt 31 is passed through the aligned apertures in the ears 29 and 30 for securing the hopper at this point to the ram case. The opposite wall of the hopper is provided with a loop or eye 32, which cooperates with an ear 33 formed also on the ram casing, the aligned openings in the eye 32 and ear 33 receiving a bolt or pin 34 for securing the hopper at that point to the ram casing.

The hopper is further braced and supported by means of rods 35 bolted, as at 36, to the retort, these rods passing through apertured clips 37 secured to the hopper and being provided with nuts 38 threaded on to the rods and arranged on opposite sides of the clip, so that the tension of these braces may be adjusted.

One wall of the throat portion of the hopper is in the form of a removable plate 39 provided with longitudinally extending side flanges 39′ which engage the side walls of the hopper throat. In securing the removable plate 39 in place the lower end thereof is inserted under plate 40′ and the other end thereof is secured in position by means of a thumb nut 40. The arrangement is such as to render the interior of the hopper accessible for cleaning or other purposes.

Arranged adjacent the rear inclined wall 41 of the hopper is an agitator for agitating the fuel within the hopper to cause the same to feed uniformly and constantly to the ram casing during the operation of the stoker. While this agitator may be of any preferred design or construction, it is here shown as comprising a longitudinal center member 42 provided with a plurality of transverse or oppositely extending pins or projections 43. A guide strap 44 is bolted to the wall 41 of the hopper for guiding the agitator during its reciprocation.

By extending the agitator into the throat portion 27 of the hopper, a constant uniform feed of the fuel through this relatively restricted area is insured.

Reciprocal movement is imparted to the agitator by means of a bell crank 45 which may be conveniently mounted upon the bolt or pin 31 previously referred to. The short arm 46 of the bell crank is pivotally connected, as at 47, to the main part 42 of the agitator adjacent the lower end of the latter, while the longer arm 48 of the bell crank is pivotally connected, as at 49, to a connecting link 50, which in turn is pivotally connected, as at 51, to a lug or ear 52 carried by the sleeve member 18. The short arm 46 of the bell crank extends through a slot in the hopper wall 41 and through a similar slot in a wear plate 53 upon which the agitator reciprocates. With a construction of this nature the movement of the sleeve-like member 18 during the reciprocation of the ram will cause a reciprocatory movement to be imparted to the agitator, as best seen in Figure 2. By arranging the agitator adjacent the lower inclined wall 41 of the hopper, any movement imparted to the agitator will cause a positive agitation and feeding of the fuel to the ram casing, as will be apparent. While the particular means for reciprocating the agitator has, in practice, been found to give uniformly satisfactory results, it will be obvious that this agitator may be actuated in various other ways.

Obviously, the sleeve member 18 partakes, at all times, of the maximum throw of the crank portion of the crank shaft, and by actuating the agitator from this member 18 the agitator will be operated with a maximum throw irrespective of the length of the stroke of the fuel feeding ram. Moreover, it has frequently heretofore been the practice to actuate agitators from a more remote point on the crank shaft, for instance, the end; but in the present arrangement the agitator is connected and operated directly from the crank bearing or connecting rod. This provides a compact and extremely simple and efficient arrangement.

From the foregoing it will be apparent that fuel deposited in the hopper will be positively fed downwardly through the throat or neck portion of the hopper into the ram casing and then by means of the ram into the retort. The construction and arrangement of parts is

simple, so that devices constructed in accordance with the invention may be quickly, economically and durably manufactured and assembled with facility. Similarly, adequate means is provided for rigidly mounting and supporting the hopper, and the shape of the latter is such as to permit ready access to the doors and other furnace structure.

While an embodiment of the invention has been described and illustrated herein somewhat in detail, it will be apparent to those skilled in this art that changes in many of the non-essential details of construction may be resorted to without departing from the spirit and scope of this invention, and to this end reservation is made to make such changes as may come within the purview of the accompanying claims.

I claim as my invention:

1. The combination with a furnace wall having a door therein and a ram casing projecting therefrom, of a fuel hopper spaced a sufficient distance from said wall to provide clearance for said door and provided with a relatively restricted throat portion connecting into said ram casing at a point closely adjacent said wall, and a fuel agitator associated with the said throat portion of the said hopper.

2. In a stoker construction, a retort, a fuel feeding ram therefor, means including a pitman rod for actuating said ram, a fuel hopper, an agitator in said hopper, and means connected to said pitman rod for actuating said agitator.

3. In a stoker construction, a retort, a fuel feeding ram therefor, means for actuating said ram including a pitman rod, a fuel hopper, an agitator in said hopper and means including a bell crank connecting said pitman rod to said agitator for actuating the latter.

4. In a stoker construction, the combination with a retort, a fuel feeding ram therefor and means for driving said ram including a pitman rod, of a fuel hopper, a reciprocating agitator arranged in said hopper and means including articulated members connecting said pitman rod to said agitator for reciprocating the latter.

5. In a stoker construction, a retort, a fuel feeding ram therefor, means for actuating said ram including a crank shaft, a pitman rod and a lost motion connection between said pitman rod and crank shaft, a fuel agitator reciprocally mounted in said hopper, and means for actuating said agitator connected to the latter and to an element of said lost motion connection.

6. In a stoker construction, a retort, a fuel feeding ram therefor, means for actuating said ram including a crank shaft, a pitman rod and a lost motion connection between said pitman rod and crank shaft, a fuel agitator reciprocally mounted in said hopper, and means for actuating said agitator including a pivotally mounted bell crank having one arm connected to said agitator and the other arm thereof connected to an element of said lost motion connection.

7. The combination with a furnace wall having a door therein and a ram casing projecting therefrom, of a fuel hopper spaced from said wall a distance sufficient to provide clearance for said door and having a relatively restricted throat portion connecting said hopper to the ram casing at a point closely adjacent said wall.

8. The combination with a furnace wall having an outwardly swinging door therein and a ram casing projecting therefrom, of a fuel hopper spaced from said wall to provide sufficient clearance for said door and having an inclined throat portion connecting said hopper to said ram casing at a point intermediate said hopper and furnace wall and a fuel agitator associated with the throat portion of the said hopper.

9. In a stoker construction, fuel feeding means, actuating means therefor including a lost motion connection, a fuel hopper, an agitator associated therewith and means for actuating said agitator connected to a movable part of said lost motion connection.

10. In a stoker construction, a retort, a fuel feeding ram therefor, a crank shaft, a lost motion connection between said ram and crank shaft, including a pitman rod and a member connected to the crank portion of the crank shaft and slidably engaging said pitman rod; a fuel hopper, an agitator therefor and means for actuating said agitator connected to the member of said lost motion connection which is carried by said crank shaft.

In testimony whereof I affix my signature.

ROYCE L. BEERS.