

June 7, 1938.

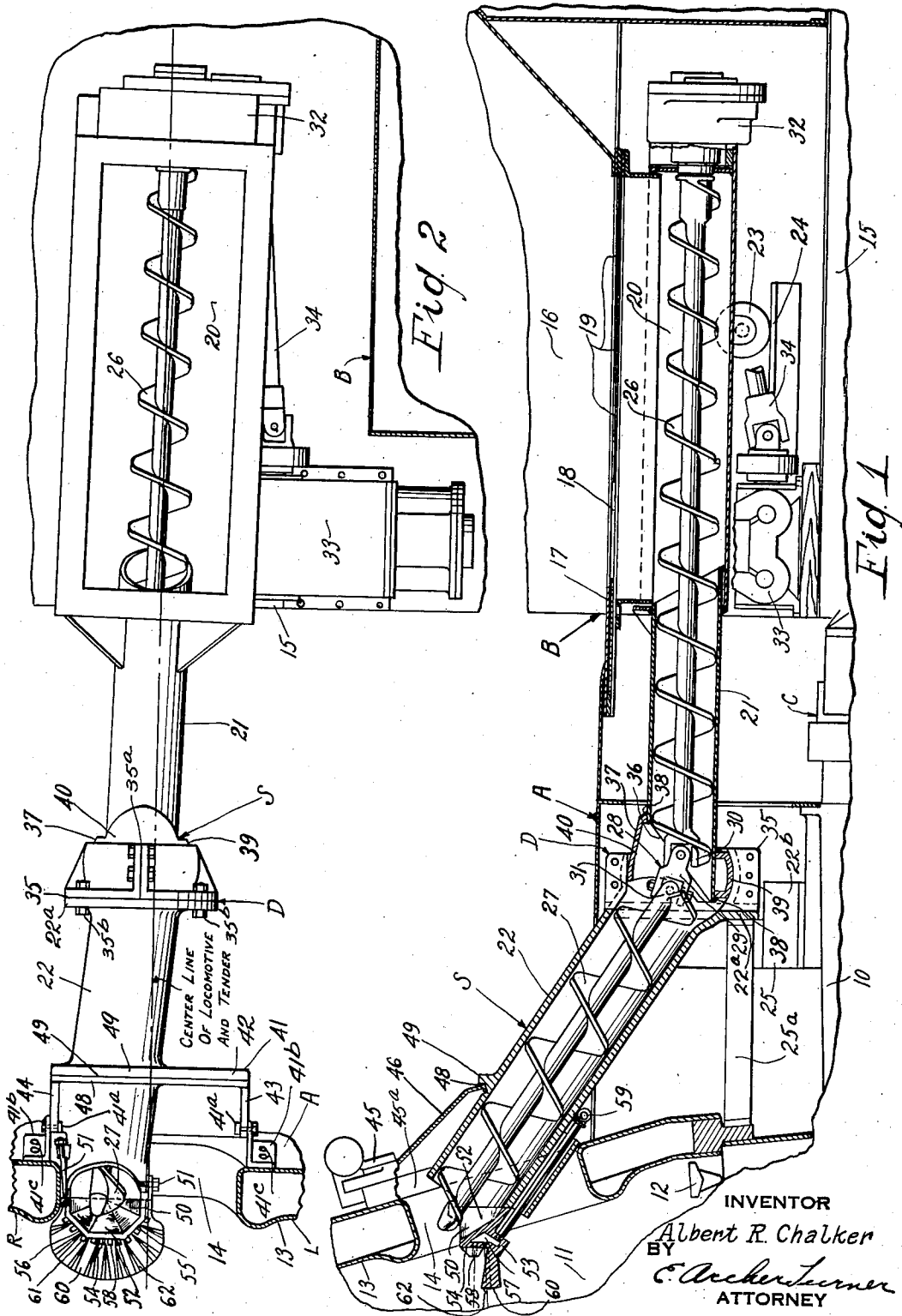
A. R. CHALKER

2,119,941

STOKER

Filed May 16, 1935

3 Sheets-Sheet 1



June 7, 1938.

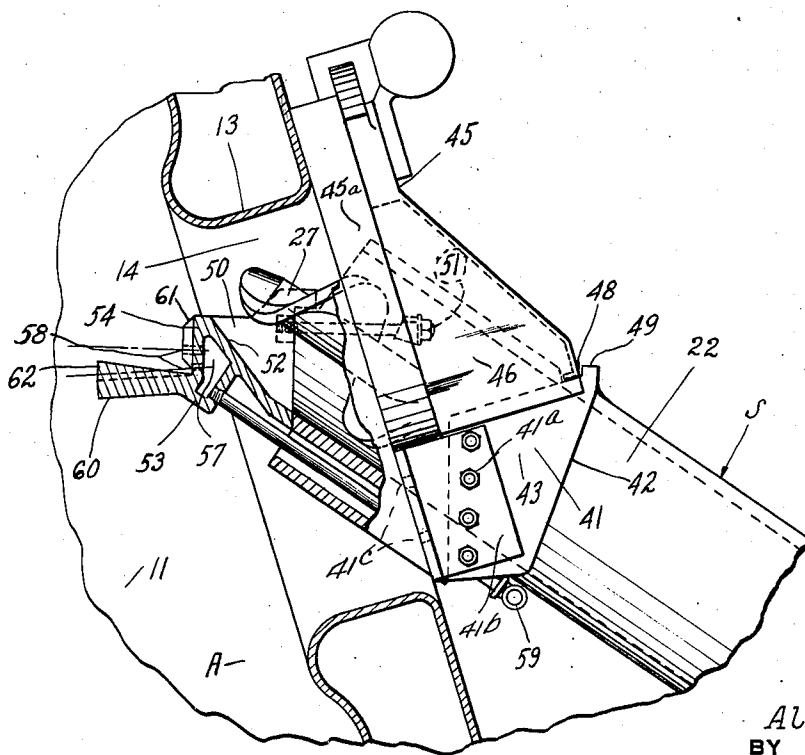
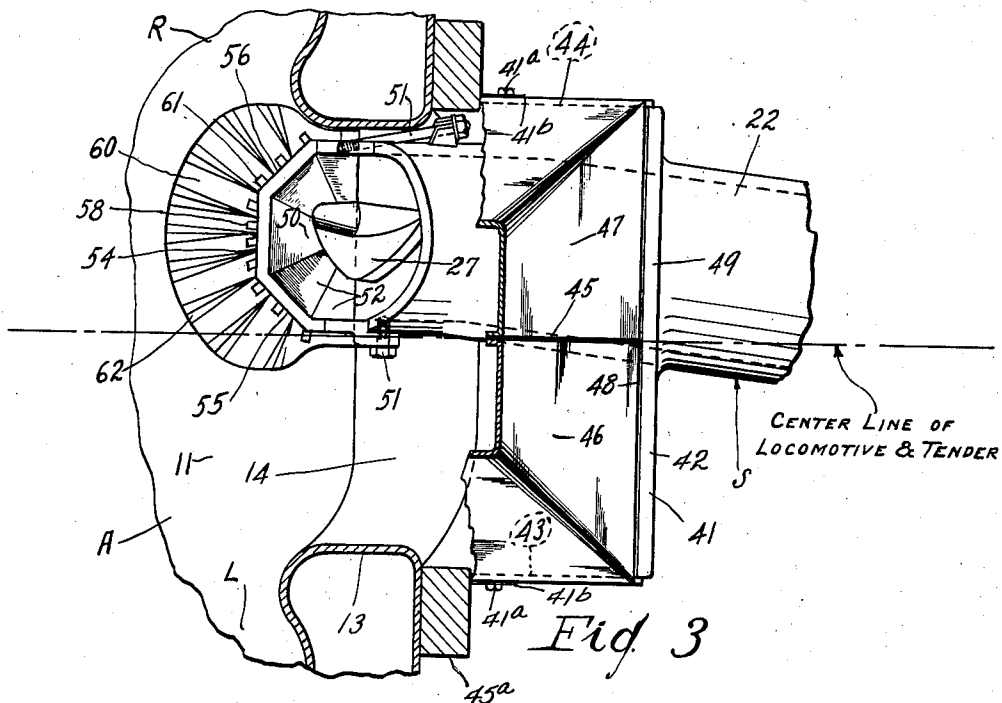
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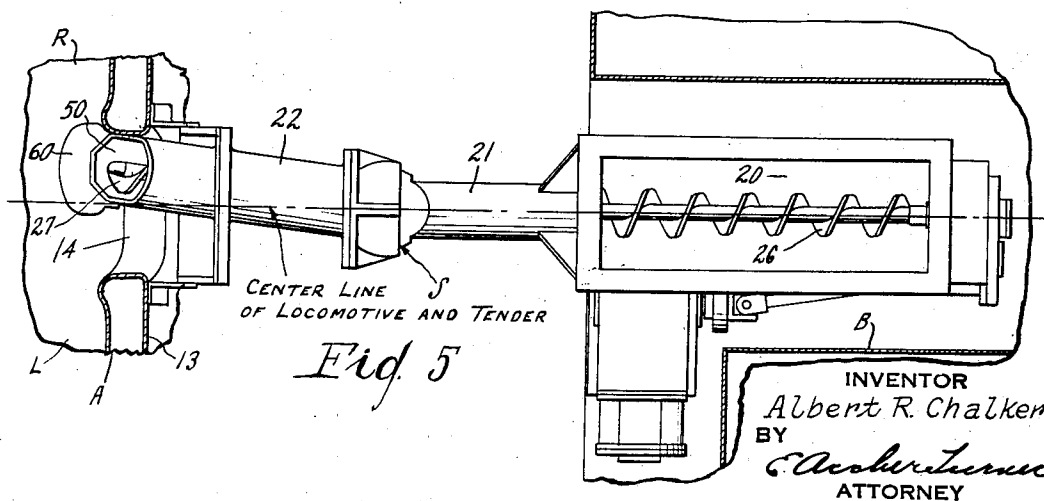
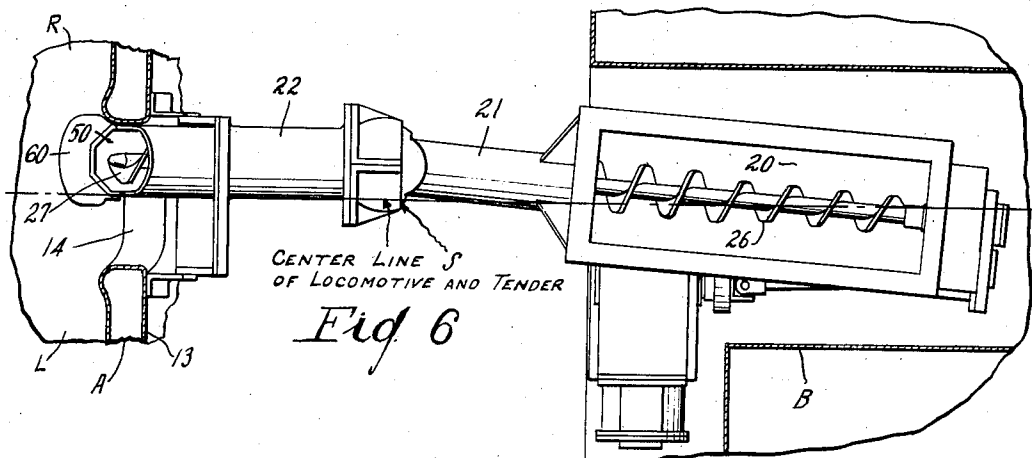
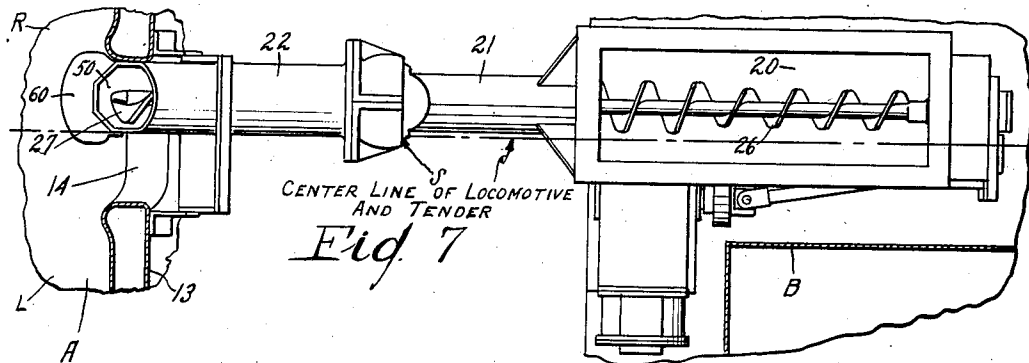
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UNITED STATES PATENT OFFICE

2,119,941

STOKER

Albert R. Chalker, New York, N. Y., assignor, by
mesne assignments, to The Standard Stoker
Company, Inc., (1922), New York, N. Y., a cor-
poration of Delaware

Application May 16, 1935, Serial No. 21,721

6 Claims. (Cl. 110-104)

My invention relates generally to stokers and more particularly to locomotive stokers of the type that convey fuel from a source of supply, as from the tender, to the firebox through the usual firing opening in the locomotive boiler backhead, from which point the fuel is scattered over the fire by a pressure fluid blast.

In stokers of the type described it has been customary to extend the discharge conduit to or into the lower portion of the firing opening in order to provide an opening between the discharge conduit and the upper marginal edge of the firing opening of sufficient size to permit manual introduction of fuel into the firebox. In consequence thereof the firing height, that is, the vertical distance between the firebox grate and the delivery end of the discharge conduit, becomes relatively low, requiring a high pressure fluid blast to project the fuel to the forward end of the firebox. One object of the present invention, therefore, resides in the provision of a novel construction wherein a high firing height is maintained, thereby requiring lower fluid pressure for projecting the fuel over the fire, and at the same time providing an opening of sufficient size for manual introduction of fuel into the firebox.

More specifically the invention contemplates the provision of a novel construction and combination of elements whereby the stoker discharge conduit is arranged to extend into one side of the firing opening, permitting manual introduction of fuel through the other side of the firing opening.

It is well known that when a helicoid screw is employed as a conveying means in the discharge conduit of a stoker, more fuel is delivered to one side of the axis of the screw than to the other, resulting, when the delivery ends of the screw and discharge conduit are located centrally of the sides of the firebox, in an oversupply of fuel to one side of the firebox with a consequent undersupply to the other side thereof. It is therefore another object of the invention to provide a novel construction, relation and arrangement of elements assuring an even delivery of fuel over the entire firebox, characterized by having the mouth portion of the stoker discharge conduit together with the delivery end of the screw and the fuel distributing plate offset from the longitudinal vertical medial plane of the firebox away from that side toward which the screw delivers most of its charge of fuel.

Still another object of the invention resides in the novel relation and arrangement of the fire-

door with the stoker discharge conduit and the novel construction of the individual parts.

These and other objects, such as the particular construction of the parts and their novel relation one with another, will be apparent from the following description when read in connection with the accompanying drawings, in which,

Fig. 1 is a vertical medial section through the stoker, with parts shown in elevation, and illustrated as applied to a locomotive and tender, adjacent portions of which are shown in longitudinal vertical section;

Fig. 2 is a plan view of the stoker and driving mechanism with parts broken away and shown in section, as applied to a locomotive backhead shown in section;

Fig. 3 is an enlarged sectional plan view through the portion of the backhead that includes the firing opening with a firedoor applied thereto, a portion of the firedoor being broken away showing a portion of the stoker in plan view;

Fig. 4 is a side elevation of the stoker and fire-door structure illustrated in Fig. 3 with parts broken away and shown in section and applied to the locomotive boiler backhead shown in vertical medial section;

Fig. 5 is a plan view of a modified form of the stoker, with adjacent parts of the locomotive and tender shown in section;

Fig. 6 is a plan view of another modified form of the stoker, with adjacent parts of the locomotive and tender shown in section; and

Fig. 7 is a plan view of still another modified form of the stoker, with adjacent parts of the locomotive and tender shown in section.

Referring to the drawings, a locomotive is indicated generally at A, a tender at B, and coupling means connecting the two in the usual manner, at C. The locomotive is provided with a frame 10, a firebox 11 having the grate 12 and a boiler backwall 13 having a firing opening 14 therein. The tender includes a frame 15, a fuel bin 16 having a floor 17 provided with a longitudinal centrally located opening 18, and a plurality of slidably mounted plates 19 normally closing the opening 18 and which may be moved from covering position to regulate the delivery of fuel from the bin 16. The fuel stored within the bin 16 is coarse coal in substantially the same form as it is mined.

A stoker indicated generally at S includes an open mouth trough 20 mounted on the tender beneath the opening 18, a tubular conduit 21 communicating with and extending forwardly from the trough 20 to the locomotive and an inclined

riser conduit 22 communicating at its lower end with the forward end of the tubular conduit 21 and at its upper end with the firing opening 14. Movement of the trough 20 incident to the relative movements of the locomotive and tender is provided for in part by mounting the trough upon rollers 23 which rest upon track elements 24 supported from the frame 15 of the tender and extend longitudinally thereof. The riser conduit 22 is rigidly secured at its upper end to the boiler backwall 13 in a manner later to be described, and at its lower end it has formed therewith an annular flange 22a, the lower portion of which is in the form of a foot member slidably resting on an inverted T-shaped bar 22b rigid with the frame 10. Thus the lower end of the riser conduit 22 is slidably supported on the frame 10. A tie plate 25 extending rigidly between the annular flange 22a and the backwall 13 braces the riser conduit 22 against forward thrust at its lower end.

Fuel is conveyed from the tender fuel bin to the firebox by screw conveying means including a screw section 26 mounted in the trough 20 and the tubular extension 21, and a screw section 27 mounted in the riser conduit 22. The screw sections 26 and 27 are universally connected at their adjacent ends by the universal joint 28. The joint 28 includes a link 29 universally attached at its ends in the jaws 30 and 31 of the screw sections 26 and 27, respectively, forming a double universal joint. The screw section 26 is driven from its rearward end through gearing (not shown) housed in the gear casing 32. A motor 33 mounted on the tender frame is operatively connected with the gearing in the casing 32 by a shaft 34.

The adjacent ends of the riser conduit 22 and the tubular extension 21 are constructed and arranged to form a universal connection D which houses the universal joint 28. The lower end of the riser conduit 22 carries a vertically split spherical clamp 35, the halves of which are bolted together as at 35a and both are secured by bolts 35b to the annular flange 22a of the riser conduit 22. The internal diameter of the split clamp 35 is greater than the diameter of the tubular conduit 21.

The forward end of the tubular conduit 21 is cut back as shown at 36 and the lower forward end only of the conduit 21 projects within the spherical clamp 35. A tubular member 37 surrounds the forward end portion of the conduit 21 and is rigidly secured thereto in any suitable manner, as by welding, shown at 38. At its forward end the tubular member 37 is provided with a spherical surface to conform with the interior surface of the clamp 35 to permit universal movement therebetween. The ball portion 39 of the tubular member 37 prevents to a large extent, the accumulation of fuel in the cavity formed by the spherical clamp 35. The upper portion 40 of the tubular member 37 forms an enlarged extension from the cut back edge 36 of the tubular conduit 21 and the forward portion thereof fits closely against the inner wall of the spherical clamp 35. It is apparent, therefore, that the portion 40 of the tubular member provides space about the universal joint 28, preventing undue packing and consequent crushing of the fuel at this point, at the same time permitting the lower portion of the forward end of the conduit 21 to extend into the spherical clamp 35 to provide a surface along which the fuel will be advanced by

the screw 26 to a point where it can be readily picked up by the screw 27.

A rectangular shaped casing, indicated generally at 41, formed with the riser conduit 22 embraces the lower portion of the firing opening 14 and is secured in a suitable manner to the backwall 13. The casing 41 comprises a rear wall 42 spaced from the plane of the backwall 13, and side walls 43 and 44 extending forwardly from the rear wall 42 to the plane of the backwall, one at each side of the firing opening. Bolts as at 41a extend through the side walls 43, 44 to secure the riser conduit 22 to the angle bars 41b, which in turn are bolted at 41c to the firebox backwall 13. Thus, the riser conduit is rigidly mounted on said backwall. The upper portion of the firing opening is provided with a power operated firedoor 45, which is preferably of the type comprising a pair of pivoted door members 46 and 47 arranged to swing laterally and upwardly, mounted in any well known manner on the fire-door frame 45a which embraces the upper portion of the firing opening 14 above the angle bars 41b. The door members 46 and 47 form in effect continuations of the side and rear walls of the casing 41, the walls forming the door members converging as they extend upwardly. The lower rearward edges of the door members are received in the groove 48, and the shoulder 49 formed on the casing 41 prevents the door members from being blown out rearwardly should an explosion occur within the firebox.

The riser conduit 22 has a casting 50 secured to its forward end in a suitable manner, as by means of bolts 51. This casting 50 is provided with a delivery floor 52 which is disposed at a steeper angle of inclination than the floor portion of the riser conduit 21. The casting 50 is stepped down, at the front end of the delivery floor 52, so as to provide a jet head 53 having a vertical front face 54 and the vertical faces 55 and 56 which are angularly disposed with respect to the front face 54. The jet head 53 is cored to provide a steam chamber 57 from which jet passages 58, arranged in an upper and a lower row, open through the vertical faces 54, 55 and 56. Steam is supplied to the chamber 57 from a suitable source of supply by the pipe 59.

A fuel distributor plate 60 extends forwardly from the jet head 53 below the level of the jets 58. The upper edge of the vertical faces 54, 55 and 56 form a spill edge over which fuel drops onto the plate 60 into the zone of action of the blasts issuing from the jets 58. The faces 54, 55 and 56 are provided with the vertical spaced projections 61 terminating at their lower ends just above the lower row of jets and through which projections the upper row of jets extends. The surface of the plate 60 declines slightly from the horizontal as it extends forwardly, and the plane of the tops of the ribs 62 formed on the plate 60 inclines slightly from the horizontal. This construction permits the fine coal to drop between the projections 61 onto the plate 60 in front of the lower row of jets which are directed slightly downwardly and which project the fine fuel forwardly between the ribs 62. The coarse fuel drops into the zone of action of the upper row of jets and is projected along the ribs 62. The upper row of jets that projects the coarse fuel thus forms a blanket over the finer fuel particles and prevents to a large extent escape of finer fuel particles over the firebox arch.

It is well known that a helicoid screw will deliver more coal to one side of its axis than to 75

the other. Thus a screw, the flights of which are so wound to advance fuel when rotated in a clockwise direction, as viewed in the direction of flow will deliver most of its charge to the left side of its axis. Referring particularly to Fig. 3, it will be seen that the screw 27 will deliver most of its charge toward the side of the firebox marked L. In the constructions shown in the prior art, the discharge end of the riser conduit is located centrally of the sides of the firebox and in order to prevent the side L of the firebox from receiving an oversupply of fuel, vanes or dividers are generally employed to direct more fuel to the side of the firebox marked R in order to obtain an even supply of fuel to both sides of the firebox. In the present construction, with the discharge end of the conduit located more to the side R of the firebox, vanes and dividers are not necessary since there is a greater area at the side L of the discharge end of the conduit than to the side R thereof which is to be supplied with fuel, and more fuel is therefore necessary on the side L to provide even distribution over the entire firebox.

As shown in Fig. 2, the trough 20 and the tubular conduit 21 are normally disposed with the axes thereof at a slight angle to the longitudinal vertical medial plane of the locomotive and tender. The riser conduit 22 is disposed with the axis thereof at a greater angle to the longitudinal vertical medial plane of the locomotive and tender so that the discharge end of the riser conduit extends into the firing opening at one side of the longitudinal vertical medial plane of the firing opening and firebox, thereby leaving the other side of the firing opening unobstructed. This constitutes the preferred form of construction since it minimizes the angle between the riser conduit screw 27 and the screw 26.

The fact that the riser conduit screw 27 extends at an angle toward the side R of the firebox, also serves to deliver more fuel to that side of the firebox; which, together with the discharge end of the riser conduit 22 being at the side R of the firebox, compensates for the action of the screw in delivering most of its charge toward the side L.

A number of factors determine just how much more coal is delivered to one side or the other of the screw, as for example, how far the screw in the riser conduit extends, the shape of the distributing means, and other factors. Thus, if it is necessary to provide more fuel on the side R of the firebox than is provided by the preferred construction, a modified form of the invention as shown in Fig. 5 may be employed.

In this modified form of construction, the trough and tubular extension lie in the longitudinal vertical medial plane of the locomotive and tender, causing the riser conduit to extend at a greater angle therefrom to the side R of the firebox. The greater angularity of the screw in the riser conduit has the effect of forcing more fuel to the side R of the firebox.

On the other hand, should it be necessary to deliver less fuel to the side R of the firebox than is supplied by the preferred form of construction, a modified form, such as that shown in Fig. 6, is advantageous. In this construction the riser conduit is offset from but parallel with the longitudinal vertical medial plane of the locomotive and tender. The screw in the riser conduit being parallel with the aforesaid plane, it will discharge less fuel to the side R of the firebox than that angularly disposed riser conduit

screw of the preferred form. The trough and tubular extension thereof may be disposed at an angle to the longitudinal vertical medial plane of the locomotive and tender as shown in Fig. 6 or it may be offset from and parallel therewith as shown in Fig. 7.

The specific form of this invention as illustrated in Figs. 5 and 7 of the present application is being claimed in my copending application, Serial No. 205,393, filed May 2, 1938, as a division of the present application. The novel construction of parts associated with the forward end of the riser conduit 22 is being claimed in my copending application Serial No. 205,394, filed May 2, 1938, as a continuation in part of the present application.

I claim:

1. In a locomotive provided with a firebox having a backwall with a firing opening therein and a tender having a fuel bin, a transfer conduit extending forwardly from beneath said bin to the locomotive and disposed at a slight angle to the vertical plane passing through the longitudinal center line of the locomotive and tender, a riser conduit communicating at its lower end with said transfer conduit and extending upwardly at a greater angle to the said plane, said riser conduit having its discharge end disposed at the firing opening in endwise communication with said firebox at one side of the vertical medial plane of the locomotive, and a distributor at the discharge end of said riser conduit for receiving fuel therefrom, said distributor being offset with respect to the vertical medial plane of the locomotive on the same side of such plane as the discharge end of said riser conduit, said distributor including fuel propelling means for projecting fuel into the firebox.

2. In a locomotive provided with a firebox having a backwall with a firing opening therein, a stoker for feeding fuel to said firebox through said firing opening comprising a riser conduit extending upwardly and forwardly from a point rearward of said backwall to said firing opening and at its upper forward end communicating with said firebox and terminating in a plane above the lower half of said firing opening, mechanical means for urging fuel through the upper forward end of said conduit, and a fuel distributor arranged to project into the firebox the fuel which is conveyed through the upper forward end of said conduit, the upper forward end of said riser conduit and said distributor being of less width than the width of the firing opening and occupying space along one side of said firing opening only to provide an unobstructed aperture at the opposite side of such opening for access into said firebox during operation of said stoker, said aperture extending above and below the plane of said distributor.

3. In a locomotive provided with a firebox having a backwall with a firing opening therein, a stoker for feeding fuel to said firebox through said firing opening comprising a riser conduit extending forwardly and upwardly from a point rearward of said backwall to said firing opening and at its upper forward end communicating with said firebox, mechanical means for urging fuel through said conduit to a point above the lower half of said firing opening, and a fuel distributor arranged to project into the firebox the fuel which is conveyed through said conduit, the upper forward end of said riser conduit and said distributor being of less width than the width of said firing opening and occupying space along one side of

said firing opening only to provide an unobstructed aperture at the opposite side of such opening for access into said firebox during operation of said stoker, said aperture extending above and below the plane of said distributor.

4. In a locomotive provided with a firebox having a backwall with a firing opening therein, a stoker for feeding fuel to said firebox through said firing opening comprising a riser conduit extending upwardly and forwardly from a point rearward of said backwall to said firing opening and at its upper forward end communicating with said firebox, mechanical means for urging fuel through the upper forward end of said conduit, and a fuel distributor arranged to project into the firebox the fuel which is conveyed through the upper forward end of said riser conduit and said distributor being of less width than the width of the firing opening and occupying space along one side of said firing opening only to provide an unobstructed aperture at the opposite side of such opening for access into said firebox during operation of said stoker, said aperture extending above and below the plane of said distributor plate, said mechanical means including a conveyor screw in said riser conduit for urging fuel toward said distributor, said screw including a helical flight wound in a direction whereby the conveyor screw delivers the greatest charge of fuel toward that side of said distributor which is positioned adjacent the unobstructed aperture in said firing opening.

5. In a locomotive provided with a firebox having a backwall with a firing opening therein, a stoker for feeding fuel to said firebox through said firing opening comprising a riser conduit extending forwardly and upwardly from a point rearward of said backwall to said firing opening

and at its upper forward end communicating with said firebox, mechanical means for urging fuel through said conduit to a point above the lower half of said firing opening, and a fuel distributor arranged to project into the firebox the fuel which is conveyed through conduit, the upper forward end of said riser conduit and said distributor being of less width than the width of said firing opening and occupying space along one side of said firing opening only to provide an unobstructed aperture at the opposite side of such opening for access into said firebox during operation of said stoker, said aperture extending above and below the plane of said distributor, said mechanical means including a conveyor screw having a helical flight wound in a direction whereby the conveyor screw delivers the greatest charge of fuel toward that side of said distributor which is adjacent the unobstructed portion of said firing opening.

6. In a locomotive provided with a firebox having a backwall with a firing opening therein and a grate for supporting a firebed, a stoker including a delivery conduit and a fuel projecting distributor arranged to supply fuel to said firebox through the firing opening, said fuel projecting distributor being disposed adjacent the discharge end of said conduit and arranged to project over the firebed of the firebox fuel which is conveyed through said conduit, said conduit and said fuel projecting distributor occupying space in said firing opening at one vertical side thereof only, leaving an unobstructed aperture extending above and below the plane of said fuel projecting distributor at the opposite vertical side of such opening for access into said firebox, and mechanical means for urging fuel through said conduit to said fuel projecting distributor.

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