Sept. 5, 1933. N. M. LOWER 1,925,988

STOKER

Filed Nov. 30, 1928 3 Sheets-Sheet 1

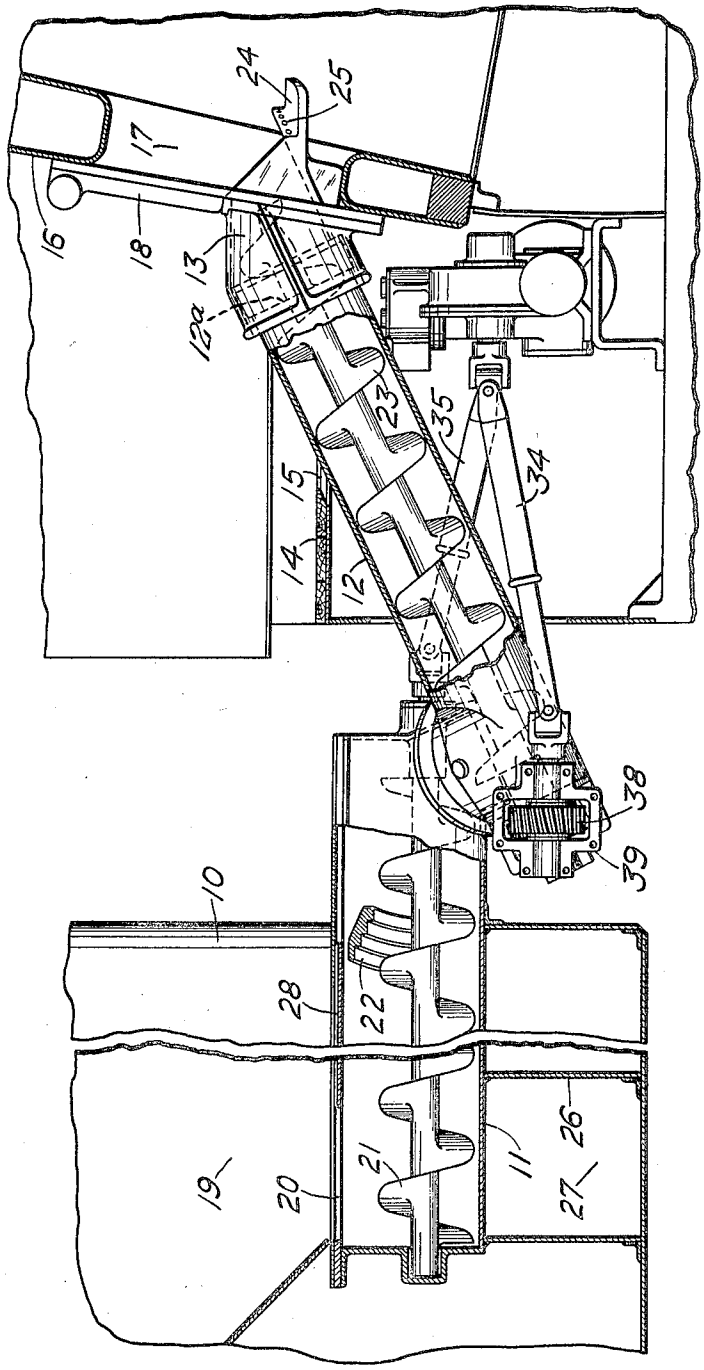


Fig. 1

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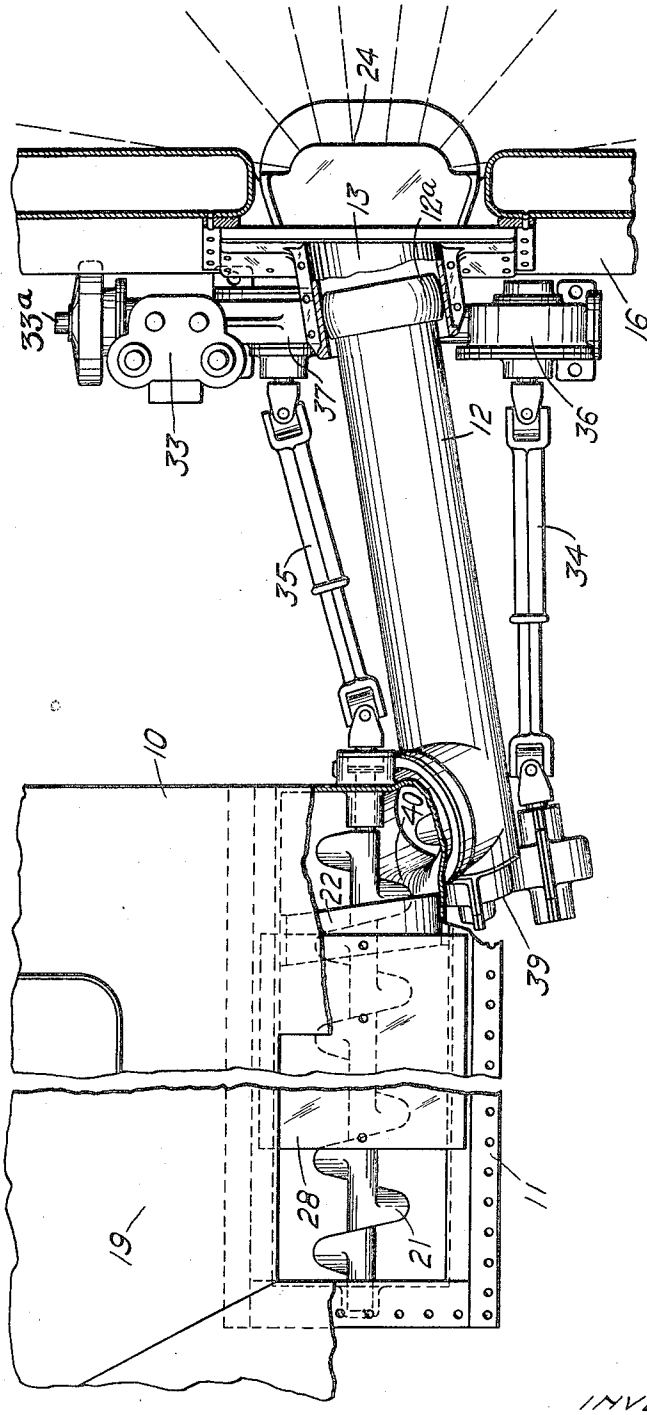


Fig. 2

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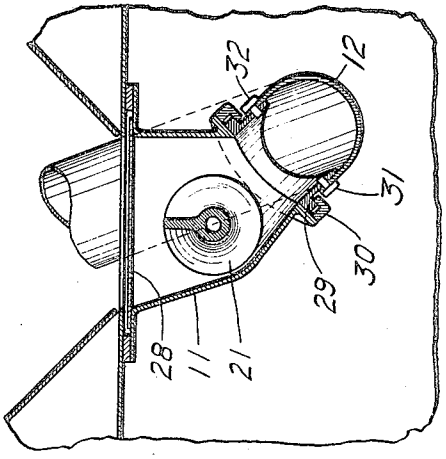


Fig. 4

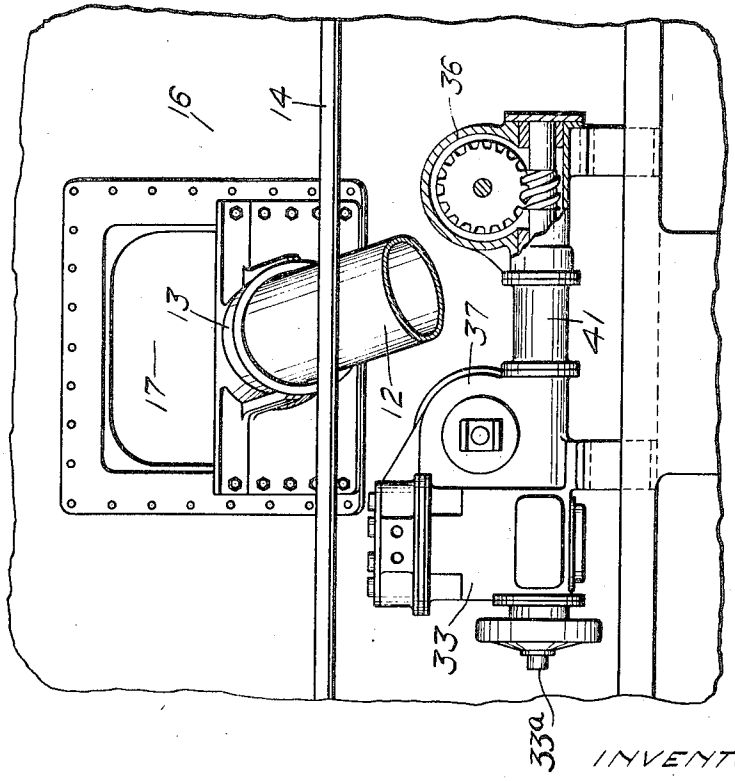


Fig. 3

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Patented Sept. 5, 1933 1,925,988

UNITED STATES PATENT OFFICE

1,925,988

STOKER

Nathan M. Lower, Bellevue, Pa., assignor to The Standard Stoker Company, Incorporated, a corporation of Delaware

Application November 30, 1928
Serial No. 322,884

10 Claims. (Cl. 198—15)

This invention relates to mechanical stokers for locomotives of the type that transfers fuel from the tender into the firebox through the lower portion of the fire-door opening by screw conveyors.

The object of the invention is to provide a stoker having a coal conveying means in the tender of the locomotive that is driven from its forward end and delivers to coal elevating means without obstruction and abrasion of the coal.

Other objects and advantages of the invention will appear from the following description and appended claims taken in connection with the accompanying drawings, in which;

Fig. 1 is a vertical sectional view taken on the center-line of the locomotive and tender, with the invention in elevation and parts thereof in section, showing the invention as applied thereon.

Fig. 2 is a part sectional plan view of the locomotive, the tender, and the invention.

Fig. 3 is a view of the rear of the locomotive showing the stoker driving unit and a portion of the stoker in the locomotive cab.

Fig. 4 is a sectional view illustrating the connection between the stoker unit in the tender and the stoker unit in the locomotive.

In Fig. 1 the numeral 10 represents the locomotive tender and 11 the tender conduit or trough of the stoker. The trough 11, at its forward end, is universally jointed to the movable inclined conveyor conduit section 12. The movable inclined conveyor 12, which has formed rigidly therewith at its forward end a ball member 12*a*, is universally supported, at its forward end, in the rigid backhead conduit casting 13 and mounted so that it can slide in the backhead casting 13, which casting where it receives the ball member 12*a* is cylindrical in form. Preferably the walls of the cylinder extend parallel with its axis. It will be observed that the ball member 12*a* is constructed as an annulus having an outer curved contact surface. This construction allows for angular movement between the tender and locomotive. As the boiler expands the inclined conveyor 12 slides inwardly in the backhead casting 13. As the locomotive travels on a curve, the inclined conveyor 12 slides outwardly in the backhead casting 13. The conduit sections 12 and 13 together form the elevator conduit of the stoker. On sharp curves, cross-overs and turn-tables there is considerable swing and drop between the tender and locomotive causing the inclined conveyor 12 to move sideways and vertically in the locomotive cab deck 14. Due to this movement, clearance is provided in the deck 14 as shown at 15 in Figure 1. The casting 13 is secured to the backhead 16 and extends in the firedoor opening 17 below the firedoor 18.

The run-of-mine coal falls by gravity from the coal bunker 19 through the opening 20 into the trough 11, where a screw conveyor 21, driven from its front end, moves it forward. By driving the trough conveyor screw from its front end a gear-box at the rear thereof, a long drive shaft at the side of the trough, and a compartment for the shaft, are eliminated.

The large lumps are reduced to a size suitable for proper firing by the screw 21 forcing them against the crusher 22, described in detail hereafter.

The coal is conveyed through the trough 11 to the edge 40 near the end of the trough 11 where it falls by gravity into the movable inclined conveyor 12, the rear end of which lies substantially below and to one side of the trough 11. By positioning the rear end of the inclined conveyor 12 below the trough 11, the inclined conveyor 12 does not protrude through the rear of the cab deck. As the coal falls into the inclined conveyor 12 an elevating screw 23, driven from its rear end, carries the coal to the jet table 24 having fluid jets 25 under pressure for distributing the fuel to all parts of the firebed.

The trough 11 is secured to the floor of the coal bunker 19 and supported by the brackets 26 on the floor of the water compartment 27. Slide plates 28 are provided in the floor of the coal bunker for preventing the entire length of the screw 12 from being exposed to the coal at one time. The conical crusher 22 is secured to the inside of the trough 11 at the desired location behind the coal-gate. The inside face of the crusher, as can be seen in Figure 1, is formed of a series of substantially horizontal and vertical surfaces, similar to steps.

The movable inclined conveyor 12 is universally connected to the trough 11 in the following manner: A ring flange 29 is loosely mounted and capable of turning between the forward end of the trough 11 and a detachably secured clamp 30. The inclined conveyor 12 is hinged to the ring flange 29 by means of the pivot pins 31 and 32. By having the ring flange 29 mounted so that it is capable of turning, the inclined conveyor 12 is permitted to move on one axis; and the pivotal connection of the inclined conveyor 12 with the ring flange 29 provides for movement of the inclined conveyor 12 on an axis at right angles to the first-mentioned axis.

The engine 33, for driving the stoker, is lo-

cated on the locomotive as close to the boiler backhead 16 as possible. The extensible and contractible, flexibly mounted drive shafts 34 and 35 are driven by the power shaft 33*a* of the engine 33 through gear reductions inclosed in the gear cases 36 and 37 respectively. The worm wheels in the gear cases 36 and 37 are driven by a common shaft coupled to the engine 33 and located in the lower portion of gear cases 36 and 37 and in the housing 41. The flexible shaft 35 drives the conveying screw 21 in the trough 11. The flexible shaft 34 drives the elevating screw 23 in the inclined conveyor 12 through a set of gears 38 inclosed in the gear case 39, at the rear of the inclined conveyor 12. It will be noted, when referring to Figure 2 of the drawings, that the stoker shaft 34 and gear case 36 are positioned on one side of the inclined conveyor 12 and the stoker shaft 35 and gear case 37 are positioned on the other side of the inclined conveyor 12.

From the foregoing description it will be apparent, to those skilled in the art, that I have invented a stoker that will conserve water space in the tender and convey fuel from the bunker to the firebox with a minimum of breakage.

What I claim as new and desire to secure by Letters Patent is:

1. In combination with a locomotive having a backhead provided with a firing opening therein, and a tender having a deck; a stoker for transferring fuel from the tender to said opening comprising a rearward conduit section rigidly mounted in the tender and having its forward end terminating beneath the deck thereof, a forward conduit section rigidly attached to the backhead in communication with said opening, an intermediate conduit section slidably supported for fore and aft movement in said forward conduit section at its forward end and flexibly connected to and suspended from said rearward conduit section at its rearward end, the rear end of said intermediate conduit section positioned to receive fuel transversely from said rearward conduit section, and a rearward conveyor screw in each of said conduit and intermediate conduit sections provided with separate driving connections.

2. In combination with a locomotive having a backhead provided with a firing opening therein, and a tender having a deck; a fuel transferring device comprising a rearward conduit section mounted beneath the deck of the tender, a forward conduit section rigidly attached to the backhead in communication with said opening, an intermediate conduit section flexibly and slidably supported for fore and aft movement at its forward end in said forward conduit section and having its rear end offset sideways and downwardly from the forward end of said rearward conduit section and in communication therewith, and a conveyor screw in each of said rearward conduit and intermediate conduit sections having separate driving connections.

3. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device including a conduit section extending from the tender to the locomotive and a conduit section rigidly mounted on the locomotive and delivering to the firebox through said opening, the adjacent ends of the aforesaid conduit sections communicating in end to end relation, said first named conduit having a ball member formed rigid therewith at its forward end and said second named conduit at its rearward end being made in the form of a cylinder to loosely and slidably receive the ball member end of the first named conduit section thereby providing longitudinal and universal movement between the named sections, and means for swivelly mounting the rearward end portion of the first named conduit section on the tender, said means resisting longitudinal movement of such section.

4. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device including a conduit section extending from the tender to the locomotive and a conduit section rigidly mounted on the locomotive and delivering to the firebox through said opening, the adjacent ends of the aforesaid conduit sections communicating in end to end relation, said first named conduit having a ball member formed rigid therewith at its forward end and said second named conduit at its rearward end being made in the form of a cylinder with its walls extending parallel to its axis to loosely and slidably receive the ball member end of the first named conduit section thereby providing longitudinal and universal movement between the named sections, and means for swivelly mounting the rearward end portion of the first named conduit section on the tender, said means resisting longitudinal movement of such section.

5. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device comprising a rearward conduit section rigidly mounted on the tender, a forward conduit section rigidly mounted on the locomotive and delivering to the firebox through said opening, and an intermediate conduit section interposed between the rearward and forward conduit sections and at its rearward end being universally connected to the rearward conduit section, the intermediate conduit section having a ball member formed rigid therewith at its forward end and the forward conduit section at its rearward end being made in the form of a cylinder to loosely and slidably receive the ball member end of the intermediate conduit section.

6. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device comprising a rearward conduit section rigidly mounted on the tender, a forward conduit section rigidly mounted on the locomotive and delivering to the firebox through said opening, and an intermediate conduit section interposed between the rearward and forward conduit sections and at its rearward end being offset to one side of and universally connected to the forward end portion of the rearward conduit section, the intermediate conduit section having a ball member formed rigid therewith at its forward end and the forward conduit section at its rearward end being made in the form of a cylinder to loosely and slidably receive the ball member end of the intermediate conduit section.

7. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device extending from said tender to said opening and including a conduit section located on the tender and a conduit section extending forwardly from the tender, the rearward end portion of the second named section being offset from the forward end portion of the first named section, a screw conveyor in each of said sections, gearing disposed at the rearward end of the second named conduit section and being

operatively connected with the screw therein, a prime mover having a power shaft, two sets of reduction gearing associated with said power shaft, a driven shaft connecting one of said sets of gearing with the forward end of the screw within the first named section, and a driven shaft connecting the other set of gearing with the gearing at the rearward end of the second named conduit section.

8. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device extending from said tender to said opening and including a conduit section located on the tender and a conduit section extending forwardly from the tender, the rearward end portion of the second named section being offset sideways and downwardly from the forward end portion of the first named section, a screw conveyor in each of said sections, gearing disposed at the rearward end of the second named conduit section and being operatively connected with the screw therein, a prime mover having a power shaft, two sets of reduction gearing associated with said power shaft, a driven shaft connecting one of said sets of gearing with the forward end of the screw within the first named section, and a driven shaft connecting the other set of gearing with the gearing at the rearward end of the second named conduit section.

9. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device extending from said tender to said opening and including a conduit section located on the tender and a conduit section extending forwardly from the tender, the rearward end portion of the second named section being offset from the forward end portion of the first named section, a screw conveyor in each of said sections, gearing disposed at the rearward end of the second named conduit section and being operatively connected with the screw therein, a prime mover mounted on the locomotive and having a power shaft, two sets of reduction gearing mounted on the locomotive and being directly associated with said power shaft, a driven extensible and contractible shaft connecting one of said sets of gearing with the forward end of the screw within the first named section, and a driven extensible and contractible shaft connecting the other set of gearing with the gearing at the rearward end of the second named conduit section.

10. In combination, a locomotive having a tender and a firebox provided with a feed opening, a fuel transferring device comprising a rearward conduit section rigidly mounted on the tender, a forward conduit section rigidly mounted on the locomotive and delivering to the firebox through said opening, and an intermediate conduit section interposed between the rearward and forward conduit sections and at its one end being universally connected to the adjacent end of one of said rigidly mounted conduit sections and at its other end having a ball member formed rigid therewith, the adjacent end of the other rigidly mounted conduit section being made in the form of a cylinder to loosely and slidably receive the ball member end of the intermediate conduit section.

NATHAN M. LOWER.

CERTIFICATE OF CORRECTION.

Patent No. 1,925,988. **September 5, 1933.**

NATHAN M. LOWER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 44, claim 1, strike out the word "rearward" and insert the same after "said" in line 45; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of October, A. D. 1933.

F. M. Hopkins

(Seal) Acting Commissioner of Patents.