Feb. 18, 1930. F. HOGG 1,747,899

COAL PUSHER FOR LOCOMOTIVE TENDERS

Filed Oct. 3, 1928 3 Sheets-Sheet 1

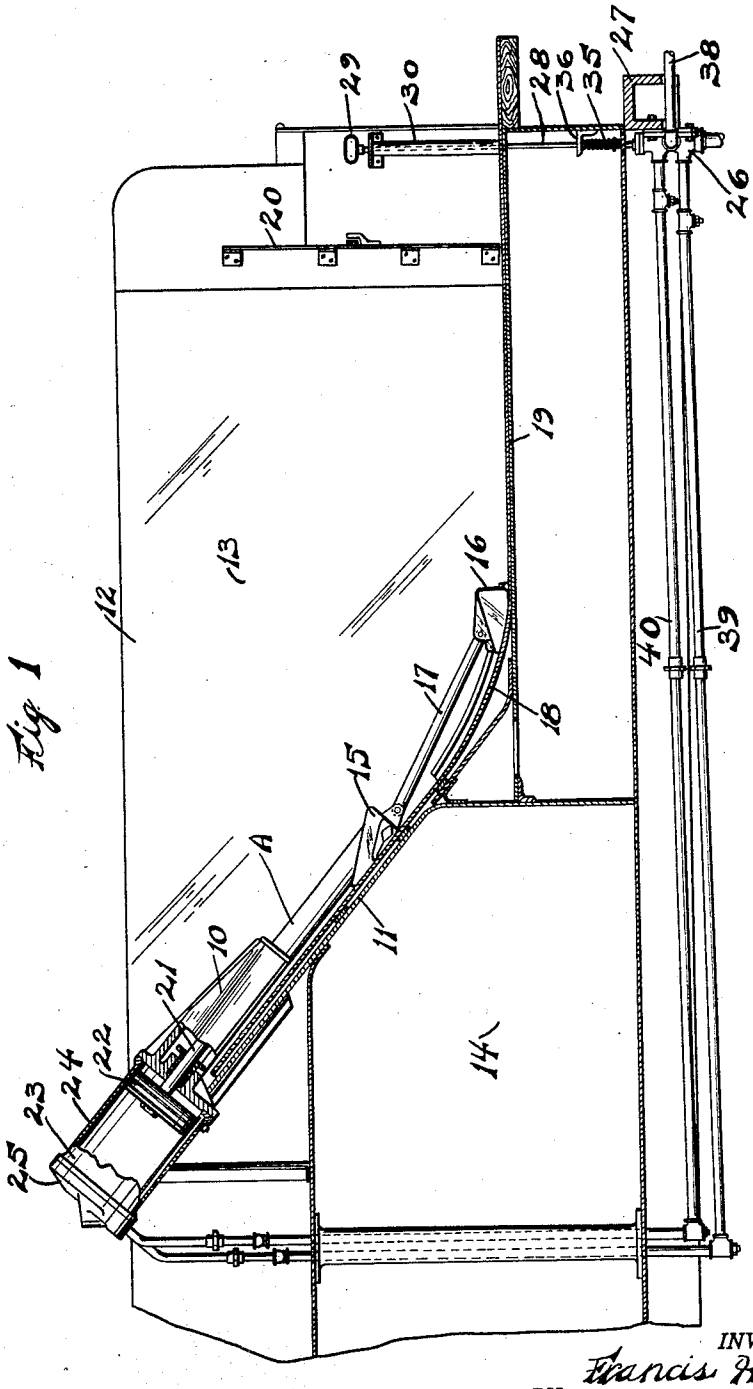


Fig 1

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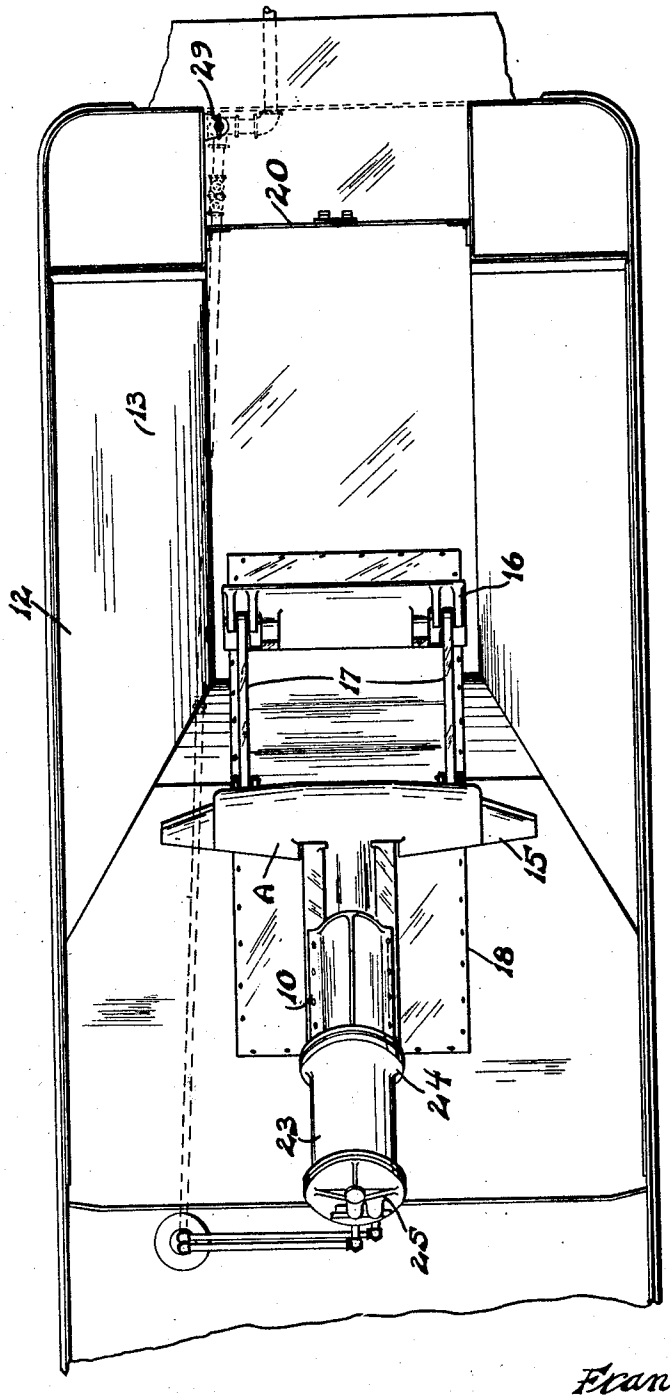


Fig. 2

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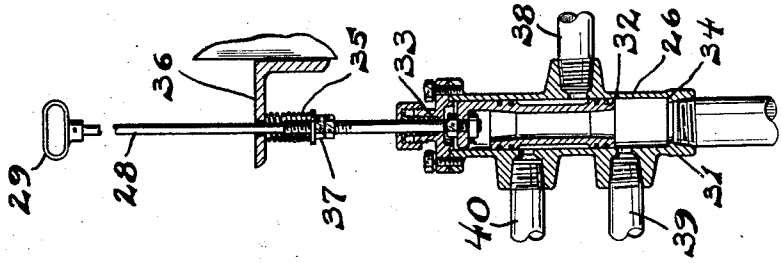


Fig 4

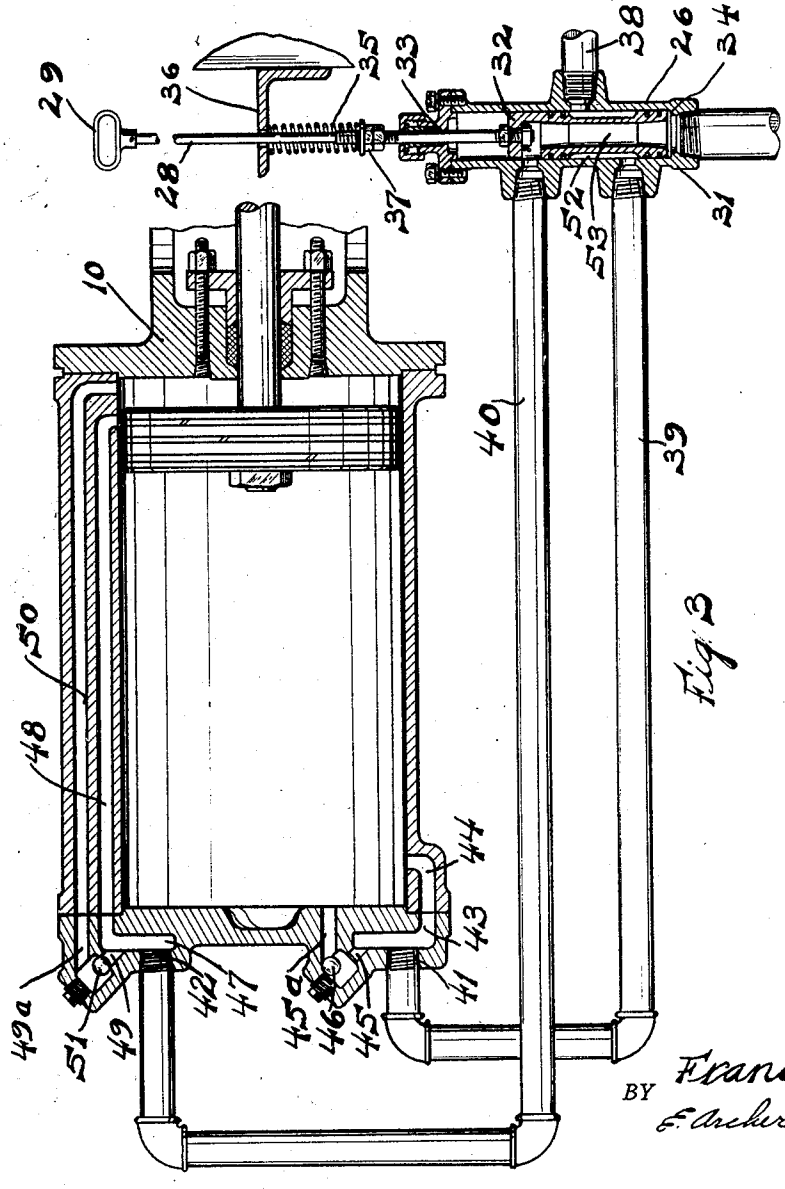


Fig 3

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UNITED STATES PATENT OFFICE

FRANCIS HOGG, OF ERIE, PENNSYLVANIA, ASSIGNOR TO THE STANDARD STOKER COMPANY, INCORPORATED, A CORPORATION OF DELAWARE

COAL PUSHER FOR LOCOMOTIVE TENDERS

Application filed October 3, 1928. Serial No. 309,912.

The invention relates to power operated appliances known as coal pushers for pushing coal from the rear to the forward portion of the coal bin of a locomotive tender in order to place it within convenient reach of the fireman. More specifically, the invention appertains to an improvement in the motor and in its means of operation for actuating the coal pusher, and is an improvement on existing devices of the character shown in United States Letters Patent No. 1,404,983, issued to Nathan M. Lower on date of January 31, 1922.

In apparatus of this type it has been usual practice to provide a motor having a steam or spring actuated distributing valve for directing the flow of steam into the motor cylinder and an additional manually controlled valve was employed for regulating the passage of steam from the source of supply to the distributing valve. This distributing valve is not positive in its movement and has been found troublesome due to breakage of its parts and in its failure to function properly at all times, under all conditions.

The coal pushers are installed to a large extent in locomotive tenders in railroad passenger train service which makes it both important and essential that the pusher should be positive in operation, regardless of the attention or inspection given to it or the climatic conditions affecting it, in order that no delay will occur in the running time of the train. To this end this invention consists in providing a manually and spring actuated valve separated from, and for operating and controlling, the pusher actuating motor and one which may be applied in any suitable position on the locomotive tender.

It is the principal object of the invention to provide in such an appliance as herein described, an improved motor and positive means for controlling the motor.

A preferred and practical embodiment of the invention is hereinafter described and is illustrated in the accompanying drawings, in which

Fig. 1 is a detail central vertical section of the tender with the improved coal pusher applied thereto; some portions of the coal pusher being broken away;

Fig. 2 is a plan view corresponding to Figure 1;

Fig. 3 is an enlarged diagrammatical view of the motor and with the operating valve shown in vertical section, and

Fig. 4 is a similar view with the operating valve in a position to control the back stroke of the motor piston.

Referring descriptively to the drawings and particularly to Figures 1 and 2, the coal pushing device, generally indicated at A, is secured through its housing member 10 by any suitable connection, such as by bolts or rivets to the sloping rear wall or back slope sheet 11 of the tender, indicated as a whole at 12, which comprises the fuel bin 13 and the water compartment 14, the two being separated by suitable walls or sheets as shown and being of well known construction. The pusher heads or pushing members are shown as two in number and indicated respectively by the numerals 15 and 16, said pusher heads are articulated together by means of connecting rods or bars 17 and they are adapted to reciprocate over a contour or wearing plate 18 which covers the slope sheet 11 and the floor 19 of the tender. The rear pusher head or cross head 15 reciprocates over the slope sheet 11 and the forward head principally over the floor 19, the function of both being to loosen and push the fuel forward toward the coal gate 20 of the tender. The pusher head 15 is connected by means of a rod 21 with the piston head 22 of a reciprocating motor, generally indicated as at 23, located at the upward end of the back slope sheet 11 and which is detachably secured to the rearward face of the housing 10, its axis being parallel with the slope sheet.

The motor 23 comprises in addition to the piston head 22, a ported cylinder 24 and a correspondingly ported removable cylinder head 25, motion being imparted to the motor by a fluid, preferably steam, the passage of which from the locomotive boiler or any other suitable source of supply is controlled by a valve mechanism, generally indicated as at 26, which is desirably though not necessarily

disposed in an upright position below the floor of the tender and is fixedly secured by suitable means to the tender frame 27, in such a position that it can be actuated by the fireman from the forward end of the tender through a valve or extension rod 28, extending upwardly through the floor 19 to a suitable height above the floor and which is provided with a lifting handle 29 or if preferred a lever arm handle of any known construction. That portion of the valve rod which extends above the floor of the tender is protected by a sleeve 30 which is securely held to the side or bulkhead of the tender.

This valve mechanism includes as best shown in the enlarged section of Figures 3 and 4, a body or casing 31 and a valve 32 mounted to reciprocate therein under the control of the valve rod 28 which is connected to the valve and extends forwardly or upwardly therefrom through a packing box or cover 33, held to the casing 31, and which forms a stop for the valve in its movement in that direction; and the valve movement in the opposite direction is stopped by the annular seat 34 at the lower and open end of the casing 31.

The valve mechanism further includes or has associated therewith, a resilient spring 35 which acts to resist upward movement of the valve and which will automatically return the valve to its downward or lowest position whenever the uplifting force has been relieved, and is disposed in a compressed position on the valve rod, above the valve and preferably externally of the casing. Said spring is held in proper position and compressed on the rod by a bracket 36 through which the valve rod passes and which is secured in any manner to a suitable part of the tender. The compression of the spring can be variably adjusted by changing the location of the bracket 36 or by the adjusting nut 37 in threaded engagement with the valve rod.

Steam from the locomotive boiler is supplied by a pipe 38 to the operating and controlling valve mechanism 26 through which it passes in a manner hereinafter described more in detail, to the motor through the pipes 39 and 40 which serve alternately as both intake and exhaust lines to their respective sides of the motor piston. Generally speaking, the upward motion of the valve, in these drawings, functions to control the backward or upstroke of the pusher heads, and the downward motion of the valve controls the forward or fuel advancing stroke of the pusher.

The cylinder head 25 has two tapped openings 41 and 42 to receive pipes 39 and 40 respectively. The opening 41 communicates with a cored passage 43 which in turn communicates with a correspondingly located cylinder port 44, which opens into the cylinder a short distance from the cylinder head, the distance being not greater than the thickness of the piston head 22. A steam intake passage 45, 45[a] of the cylinder head also opens into the port 43, the ball check valve 46 thereof shutting off the flow of exhaust steam through said passage from the cylinder into the port 43 and pipe 39. Likewise, the pipe 40 through the tapped opening 42 is in communication with a cylinder head port 47 which opens to a corresponding cylinder port 48, extending along the cylinder to and opening into the cylinder at a point a short distance from its housing end. An intake port 49, 49[a] communicates with the pipe 40 and port 47 and which in turn directs the passage of steam into a corresponding cylinder port 50 which opens into the cylinder at its extreme housing end. The ball 51 of this steam inlet port closes by gravity or by pressure of steam attempting to exhaust through the passage.

In the operation of the pusher, when the valve is in the position shown in Figure 3, steam from the supply pipe 38 passes through the annular port 52 about the valve 32 to the pipe 39 from which steam enters the left hand end of the cylinder through the port 43, raising the ball 46 and passes into the cylinder through the port 45, 45[a], the expansion of the steam moving the piston toward the opposite or housing end of the cylinder. As the piston moves by and opens the cylinder port 44, an additional supply of steam enters the cylinder to assist the movement of the piston. While the piston is making this movement, the steam in the cylinder ahead of the piston exhausts through the cylinder port 48, the head port 47, the pipe 40 and into the atmosphere through the tubular opening 53 of the operating valve. As the piston approaches its position shown in Figure 3, it closes the port 48 trapping the exhaust steam in the remaining portion of the cylinder which cannot escape through the port 50 due to the pressure of the exhaust steam seating the ball 51, therefore, an effective cushion is provided for the piston at the end of its stroke. This movement of the piston places the pusher head in the forward or normal position as shown in Figures 1 and 2.

By raising the operating valve to the position as shown in Figure 4, the steam from the supply line 38 is directed by the valve 32 to the pipe 40 through which the steam passes into the head port 47, raising the ball 51 and passing into the cylinder through the communicating ports 49, 49[a] and 50, thus moving the piston toward the left hand end of the cylinder. In this movement of the piston the steam exhausting from the cylinder passes through the ports 44, 43 and the pipe 39, below the end of the operating valve to the atmosphere. A cushion is provided for the piston as it approaches the end of its stroke

by reason of its closing the port 44 and the pressure of the trapped steam seating the ball 46. In this backward movement of the motor piston, the pusher heads are moved rearward and upward from their position shown.

After the backward stroke of the pusher is completed, the fireman by releasing his grasp upon the valve handle 29 permits the action of the resilient spring 35 to automatically return the valve to its downward and normal position, which position of the valve as heretofore described, will return the piston and the pusher heads to the forward position, pushing the coal ahead while making this forward stroke.

In practice the pusher is operated at intervals and if desired, the steam supply pipe 38 may be constantly open and consequently steam pressure will be uninterruptedly applied to the rearward or cylinder head side of the piston thereby holding the piston and pushing heads in the lowest position between operations of the pusher, preferably however, a more economical operation can be obtained by shutting off the supply of steam to the motor by closing a valve, not shown, which is ordinarily provided in the supply line 38 at a point in the locomotive cab within reach of the fireman.

By the arrangement described, the motor piston is normally held at the lower end of the cylinder and consequently the pusher heads at the end of their down stroke. When the fireman desires to advance coal within the bin he raises the operating valve by grasping the extension handle and lifting the valve rod, thereupon instantly admitting steam to the forward face or housing side of the piston, thereby causing the back stroke of the piston and pusher heads, which has the effect of loosening the fuel as the pusher heads rise in the coal bin. After the back stroke has been completed, the fireman by releasing his grasp upon the handle permits the spring to automatically return the valve to its lowest and normal position and consequently the piston of the motor and the pusher heads 15 and 16 will make the forward or down stroke to the position shown in the drawings, causing the fuel to be advanced in the bin. The motor is therefore of the single stroke type, each complete cycle depending upon the movement of the operating and controlling valve which is positively controlled by the fireman.

From the foregoing description, it will be recognized that I have provided a single manually and spring actuated valve which positively controls the movement of the pusher actuating motor; and have also provided a cushion chamber at each end of the motor cylinder to prevent breakage of the motor parts as each stroke of the piston is completed. This invention can be readily and inexpensively installed on existing pushers to improve their operation.

I claim:—

1. The combination with a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a pressure fluid motor for actuating the pusher, and a single manually and spring actuated valve for distributing the pressure fluid to said motor and for controlling said motor.

2. The combination with a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a pressure fluid motor for actuating the pusher and a single manually and spring actuated valve for distributing the pressure fluid to said motor and for controlling said motor, said valve being manually actuated in one movement and spring actuated in the other.

3. The combination with a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a motor for actuating the pusher and a valve for controlling the motor, said valve manually operated for controlling the rearward reciprocation of the pusher and automatically spring operated for controlling the fuel advancing reciprocation of the pusher.

4. The combination of a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a pressure fluid motor for actuating the pusher, said motor including a ported cylinder and a detachable ported cylinder head therefor, a single valve mounted on the tender independent of and for distributing the pressure fluid to said motor and for controlling the motor, and passages connecting the cylinder head with the valve.

5. The combination of a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a motor for actuating the pusher, said motor including a ported cylinder and a detachable ported cylinder head therefor having its ports communicating with the ports of said cylinder, valve mechanism mounted on the tender independent of, and for controlling the motor, a pair of passages connecting the cylinder head with the valve mechanism, said valve mechanism comprising a casing communicating with the passages, and a valve mounted to move longitudinally in the casing for controlling the flow of steam into said passages.

6. The combination of a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a motor for actuating the pusher, said motor including a ported cylinder and a detachable ported cylinder head therefor having its ports in communication with the ports of said cylinder, valve mechanism mounted on the tender independent of,

and for controlling the motor, a pair of passages connecting the cylinder head with the valve mechanism, each of said passages being in communication with separate ports in the cylinder head, each of said ports having an exhaust passage and an intake passage leading therefrom to its respective end of said cylinder, and a valve opening in one direction only in each of said intake passages for preventing the flow of exhaust steam through said passage.

7. The combination of a locomotive tender having a fuel bin, of a reciprocable pusher for moving the fuel to the forward end of the bin, a motor for actuating the pusher, said motor including a ported cylinder, a piston adapted to reciprocate therein, and a detachable ported cylinder head having its ports in communication with the ports of said cylinder, valve mechanism mounted on the tender independent of, and for controlling the motor, a pair of passages serving alternately as intake and exhaust passages connecting the cylinder head with the valve mechanism, each of said passages being in direct communication with separate ports in the cylinder head, each of said ports having an exhaust passage and an intake passage leading therefrom to its respective end of said cylinder, said exhaust passage from each cylinder head port opening into its respective end of the cylinder a distance from the cylinder face not greater than the thickness of the motor piston to provide a cushion chamber at each end of the cylinder when said exhaust passage is closed by the piston, and a valve in each of said intake passages for preventing the exhaust of steam from said cushion chamber.

8. As an article of manufacture, a cylinder head for a reciprocating motor, comprising a pair of independent ports adapted to serve alternately as intake and exhaust ports from a motor cylinder, each port having a tapped opening adapted to receive a steam supply pipe, each of said ports having an exhaust passage and an intake passage leading therefrom and opening into the face of the cylinder head, and a one way valve in each of said intake ports.

In testimony whereof I affix my signature.

FRANCIS HOGG.