This invention relates to locomotive stokers and particularly to that type of stoker wherein the fuel is delivered to the fire through a conduit which enters the fire box beneath the grate and thence passes upward through the grate and terminates in a delivery opening above the fire.

In this type of stoker, a plurality of communicating conduits extend forwardly from beneath the fuel bin of the tender, terminating in an upturned elbow and riser conduit that passes up through the firebox grate a substantial distance above the grate level. Screw conveying means terminating at the elbow of the conduit system advances fuel through the conduits and forces it through the elbow and up through the riser conduit.

The object of the present invention is to provide a front end construction for a stoker of the type described wherein the fuel will have such a very short and direct passage from the forward end of the conveyor screw to the mouth of the discharge conduit that packing of fuel is minimized permitting the fuel to emerge more freely and in a steadier stream from the mouth of the discharge conduit.

In locomotives equipped with stokers in which the fuel is introduced through a conduit extending through the firebox grate and located within the firebox, there is a loss of efficiency due to the grate area taken up by the stoking mechanism and consequently the amount of fuel that can be burned, and the blanking off of a substantial portion of the back water leg of the firebox by the stoking mechanism, thereby reducing the steaming capacity of the boiler. This is not a serious objection in large fireboxes, but in smaller fireboxes it becomes more pronounced. It is therefore, another object of the invention to provide a stoker of this general type in which encroachment of the stoker on the grate area and the firebox back water leg is reduced.

A further object of the invention is to provide a novel discharge end for a stoker of the type described including an elbow shaped discharge conduit, pressure fluid distributor head and firing table, that is compact, takes up a minimum amount of space in the firebox and that is readily assembled.

Other objects and advantages of the invention residing in the features of construction, combination of elements, and arrangement of parts, will become apparent from the following description and the accompanying drawings, in which:

Figure 1 is a fragmentary diagrammatic view of a locomotive and tender with the novel stoker applied thereto and shown in central vertical longitudinal section with parts in elevation;

Figure 2 is a fragmentary plan view of the stoker shown in Figure 1; and

Figure 3 is an enlarged sectional plan view through the fluid pressure distributor head of the stoker.

A conventional type of locomotive and tender is indicated generally by the numerals 10 and 11, respectively. The locomotive 10 includes a cab deck 12, a sloping back water leg 13 having a firing opening 14 above the level of the cab deck 12, a firebox 15 and the firebox grate 16. The walls of the boiler including its back water leg 13 which enclose the firebox 15 are, as usual, hollow and are bounded at the bottom by a foundation or mud ring 17. The tender 11 is provided with a fuel bin 18 having an apertured floor 19.

Mounted beneath the apertured floor 19 of the tender and arranged to receive fuel from the fuel bin 18 is the stoker trough 20, through which the fuel is conveyed by a screw conveyor 46 as shown in Figure 2. The trough 20 is provided at its forward end with a short tubular extension 21 which communicates with a forwardly extending tubular conduit comprising a rearward section 22 universally jointed to the tubular extension 21, and a forward section 23 loosely telescopically connected with the rearward section 22.

The forward section 23 is universally jointed at its forward end with a horizontal tubular conduit 24 which is supported on the frame 25 of the locomotive and terminates at its forward end beneath the mud ring 17. A system of screw conveyors including the screw conveyor 46 in the trough 20, a screw conveyor 28 in the telescopic conduit sections 22, 23, and a screw conveyor 27 in the conduit 24 conveys fuel forwardly through the conduit system. Since the forward end of the screw conveying system is not fixed in a bearing it bears against the walls of the forward end of conduit 24 causing this portion of the conduit to wear more rapidly than other parts. For this reason conduit 24 is preferably made in a number of sections including rear section 20 and vertically split front sections 29 and 30, permitting renewal of the faster wearing parts without replacing the entire conduit. If desired, the conduit 24 may, of course, be made in one piece.

The forward end of conduit 24 communicates with a 90° elbow conduit 31 supported on the locomotive frame 25 and extending upwardly through the firebox grate 16. Since in stoker firing, with a stoker of the type described, fuel is continuously being fed over the fire bed instead of intermittently as in hand firing, a shallower and more efficient fire bed can be maintained. It is generally desirable to maintain a fuel bed of approximately 4 to 6 inches deep. In the present construction, the upwardly extending portion of elbow conduit 31 terminates approximately 8 inches above the level of the grate 16 or several inches above the preferred level of the firebed. In larger fireboxes, it is preferable to have the
discharge end of the stoker at a greater height above the level of the grate, in order to reduce the pressure of the fuel projecting jets of steam or other fluid. Because of the inwardly sloping back water leg of the conventional type of locomotive, it is apparent that the higher the discharge mouth of the stoker, the farther inwardly of the firebox the discharge conduit will extend and consequently occupy a greater area of the firebox grate and back water leg. As pointed out before, in a large firebox this is not a serious disadvantage and is preferred in order to reduce the jet pressure necessary to project fuel to the distant areas of the firebox. However, in smaller fireboxes, for which the present invention is particularly adapted, the amount of space that the stoker blanks off the grate and back water leg, is material to the efficient operation of the boiler.

Referring to Figure 1, it will be seen that in the present construction, the upper rearward edge of the mouth of the elbow 31 lies in a vertical transverse plane which if extended upwardly intersects the back water leg 13 at a point below the firing opening 4. With the upwardly extending portion of the elbow conduit 31 disposed in such close proximity to the back water leg 13, it is apparent that the conduit 13 obstructs a minimum of grate area.

The rear wall 32 of the upwardly extending portion of the elbow conduit 31 is indented as at 33, in which indentation is mounted a pressure fluid jet head 34. The jet head 34 is secured to the elbow conduit 31 in any suitable manner, as by bolts 35 passing through the flanges 36 and the rear wall 32 of the upwardly extending portion of conduit 31. The jet head 34 slopes forwardly from its lower to its upper end so that at its lower end it projects rearwardly of the rear wall 32 and at its upper end projects forwardly of the rear wall 32 into the mouth of the conduit 31. Fluid, such as steam, is admitted to the jet head 34 through its bottom by means of a plurality of pipes 37 extending beneath the mud ring 17.

The upper edge of the jet head 34 extends above the upper edge of the conduit 31, as best shown in Figure 1, and is provided in its wedge shaped front wall with a plurality of jet openings 38, as shown in Figure 3, directed over all parts of the firebox for projecting the coal as it emerges from the conduit 31. The jet head 34 is preferably divided into a plurality of compartments 39 each connected with a separate pressure fluid pipe 37, so that by means of suitable valves (not shown) in the pipes 37 the pressure fluid in the various compartments 39 may be controlled thereby controlling the amount of fuel projected over various areas of the firebox.

The jet openings 38, as shown in Figure 1, are inclined from their respective inlet ends to their respective outlet ends in order to gain the proper trajectory for projecting the fuel. It desired the inclination of the jet openings 38 of any compartment 39 may vary in accordance with the distance from the jet openings to the wall of the firebox toward which they are directed.

Supported from the upper end of the conduit 31 is a protecting grate 40 substantially U-shaped in horizontal cross section protecting the sides and front of the conduit 31 from the heat of the firebox. The protecting grate is spaced from the conduit 31 permitting air to be drawn through this space from the ash pit 41. A plurality of openings 42 in the protecting grate 40 permit the air to be drawn into the firebox by the draft there-