

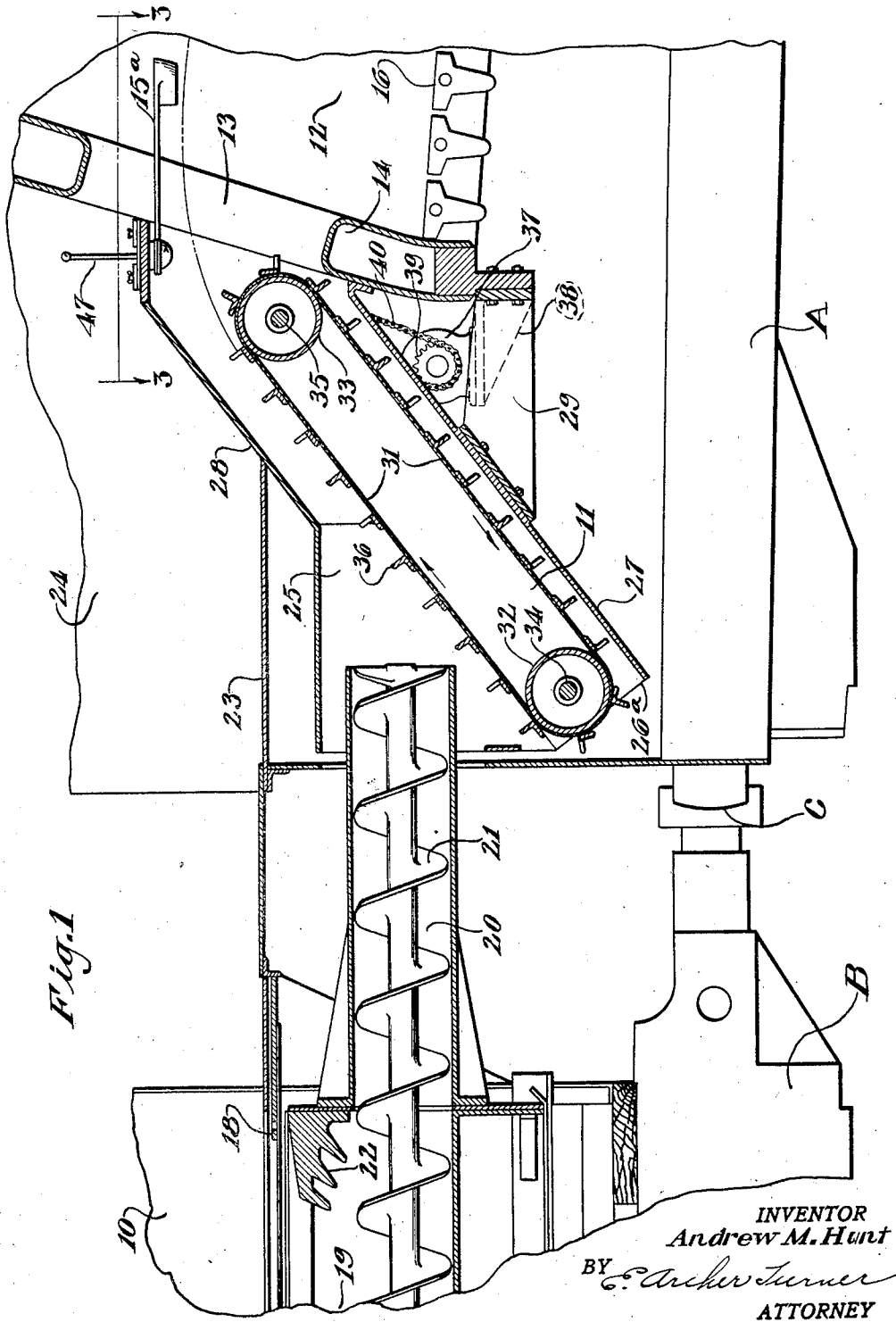
Aug. 13, 1935.

A. M. HUNT

2,011,284

MECHANICAL STOKER

Original Filed Dec. 20, 1923 3 Sheets-Sheet 1



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MECHANICAL STOKER

Original Filed Dec. 20, 1923 3 Sheets-Sheet 2

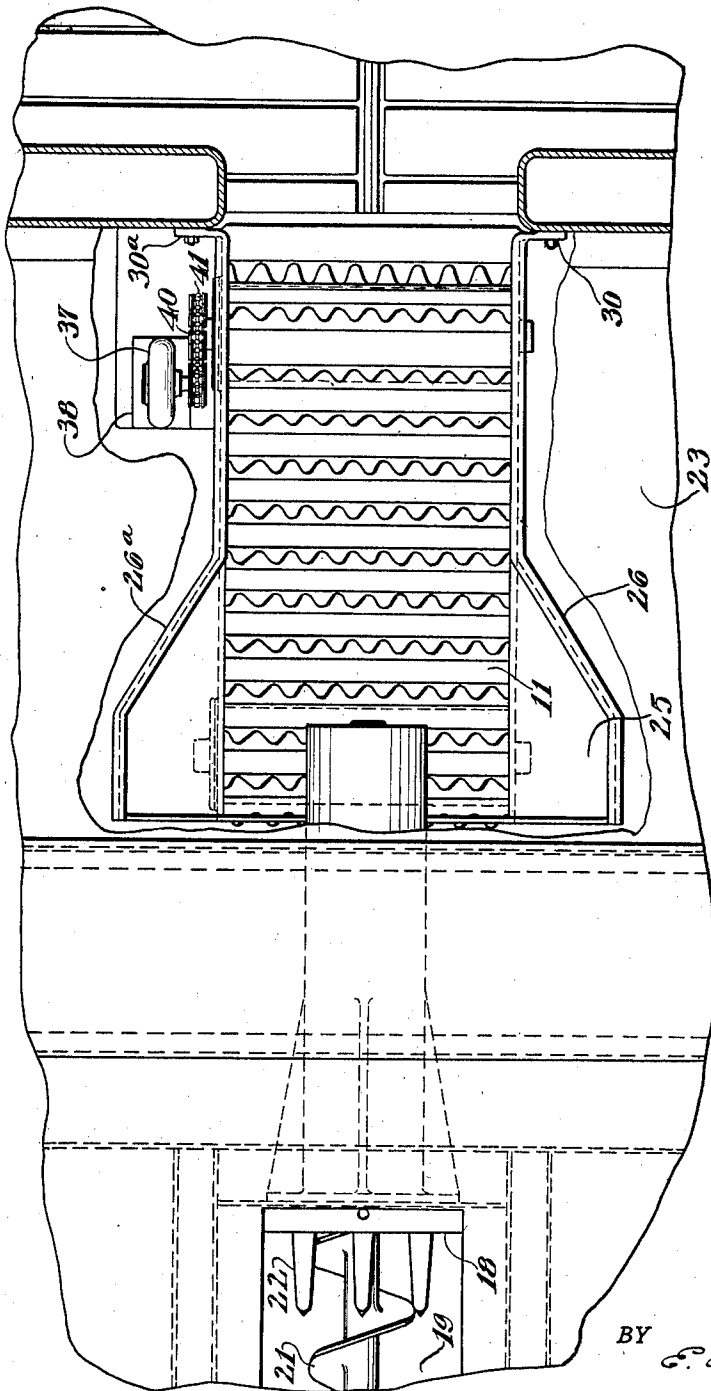


Fig. 2

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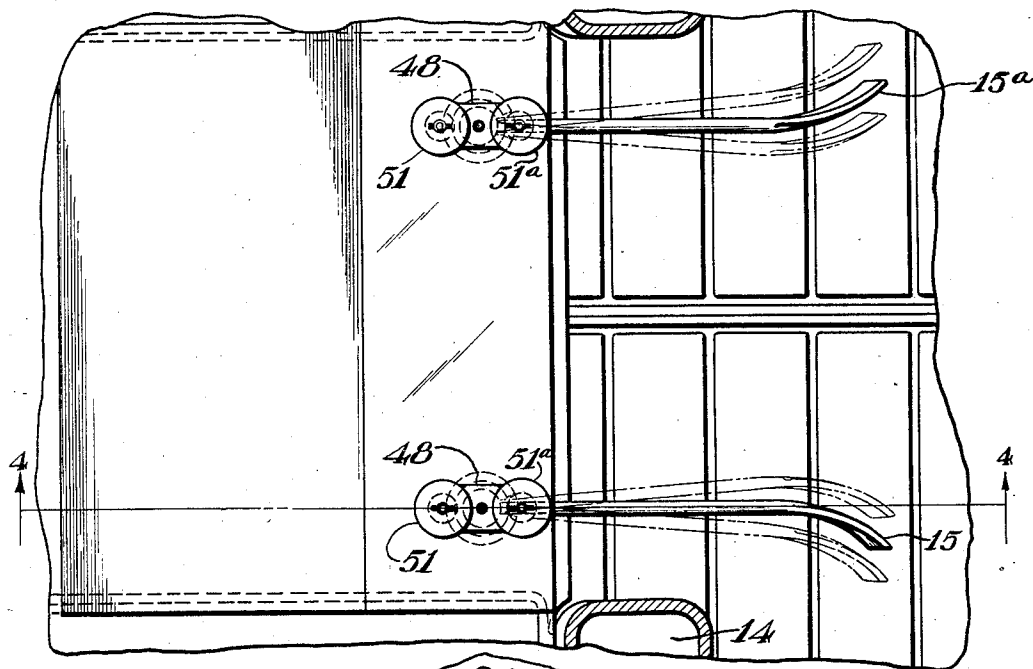


Fig. 3

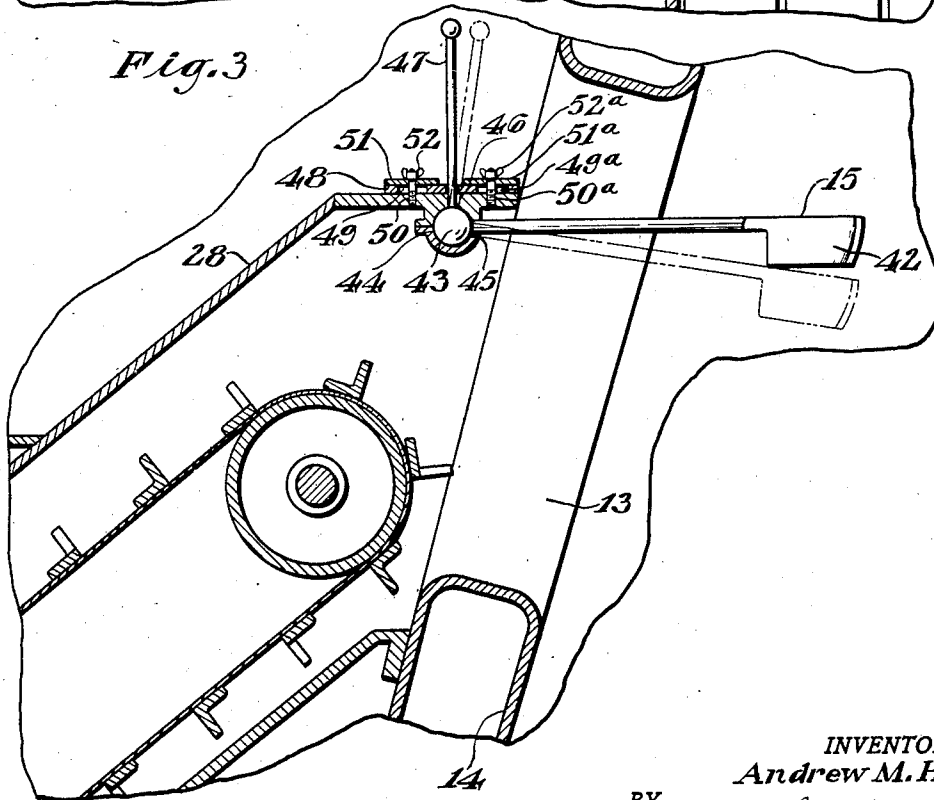


Fig. 4

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2,011,284

MECHANICAL STOKER

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Application December 20, 1928, Serial No. 327,260
Renewed January 12, 1935

4 Claims. (Cl. 110—101)

This invention relates to stokers in general and especially to mechanical stokers for locomotives; and has for its principal object the provision of a simplified, improved type of stoker which delivers the fuel continuously to a firebox, and in which the fuel is conveyed from a fuel bin to an elevator member which acts directly to discharge or project the fuel over the firebed.

Another object of the invention is the provision of new and improved mechanical means for distributing the fuel over the furnace or firebox as it is being projected thereinto.

Further objects and advantages of the invention will be apparent from the following description read in connection with the accompanying drawings, in which

Fig. 1 is a central longitudinal vertical section through the stoking apparatus and portions of the locomotive and tender;

Fig. 2 is a plan view corresponding to Figure 1 with some portions broken away and other parts removed;

Fig. 3 is an enlarged fragmentary plan section on the line 3—3 of Figure 1;

Fig. 4 is an enlarged fragmentary vertical section on the line 4—4 of Figure 3.

Stokers known in the art as the mechanical type usually employ reciprocating or oscillating members for discharging or projecting the fuel into the firebox and which parts having substantial mass and being periodically accelerated, retarded or reversed, subject their associated parts to abnormal stresses resulting in excessive wear of the parts or necessitating the use of additional means for counteracting the stresses set up during operation of the device. Complicated mechanism is in many instances required for imparting the desired motion to these parts, which mechanism requires attention and the maintenance is such that its use is objectionable.

By reason of the simplicity of delivery of the stoker of this invention, there is not the necessity for complicated mechanism, nor are the parts subjected to severe stresses as above described. Its simplicity of construction, arrangement of its parts and efficient delivery and distribution of the fuel will be observed from the drawings which illustrate the invention as applied to a locomotive and from the following description which describes it as being applied thereto, but it is obvious, however, that its use is not to be restricted to any ordinary or special form of boiler and that it is equally adaptable to other than locomotive furnaces or fireboxes.

In the drawings, referring particularly to

Figures 1 and 2, the illustrated embodiment of this invention is shown as applied to the locomotive, generally indicated at A, and a tender therefor indicated as a whole at B, the two being connected together for railroad service in the ordinary manner by an articulated coupling C. This illustrated embodiment of the invention is made for the purpose of continuously and mechanically conveying the fuel from the fuel bin 10 of the tender to an elevating member 11 of the locomotive which member not only elevates the fuel to a point above the level of the fire, but also acts directly to discharge the fuel into the firebox 12 and over the firebed thereof, preferably, discharging or projecting the fuel through the firing opening 13 of the backwall 14, the distribution to the sides and corners of the firebox being brought about in cooperation with adjustable deflectors 15, 15a which are so arranged that certain portions of the fuel after leaving the elevating member 11 are directed in a manner whereby a uniform distribution over the fire grate 16 is obtained.

The fuel bin 10 of the tender has a centrally apertured floor provided with slidable plates 18 for forming a shiftable opening through which the fuel is permitted to drop into a transfer conduit comprising a rearward trough portion 19 and a rigid forwardly extending tubular portion 20, the transfer conduit being fixedly secured to the tender below the fuel bin. There is mounted within the transfer conduit a conveyor screw 21 extending through the trough 19 to the forward extremity of the tubular extension 20. The screw 21 may be actuated from the rearward end of its trough portion through suitable gearing by any form of driving motor that will impart, preferably, continuous motion to the screw, although, if desired, the screw may be actuated intermittently, this driving means not being shown on these drawings as the construction is known to those familiar with stoking devices. A crusher member 22 is disposed above the screw at the forward end of the trough portion 19 for engagement with the larger lumps of fuel being advanced by the screw and is particularly adapted to reduce such lumps to a suitable size for firing. The construction and arrangement of the transfer conveyor is such that it is capable of handling lump, granulated or pulverent fuels with equal efficiency.

As will be best observed from Figures 1 and 2, the rigid tubular portion of the transfer conveyor terminates in the locomotive at a point rearward of the firebox backwall 14 and preferably below

the cab floor 23 of the locomotive cab 24. The forward end of this conduit is unattached and projects into and is partially surrounded by the laterally and vertically flaring lower and open rearward end of a box-like or rectangular shaped elevator casing indicated as a whole at 25 which comprises side walls 26, 26a, and a bottom wall 27 and a detachable top wall 28 made in the form of a sectional cover which can be removed to give access to the elevator member 11 housed therein and mounted for rapid movement as hereinafter more fully described. The casing 25 is suitably supported on the locomotive and secured to the firebox backwall thereof as by the bracket 29 and by suitable bolts through the laterally extending flanges 30, 30a of the elevator casing side walls as will be seen from Figure 2. Thus, securing the transfer conveyor commonly referred to as stoker tender unit to the tender and the elevator casing or stoker locomotive unit to the locomotive firebox and having the parts so arranged that no connections or joints are needed between them, provides a simplified device, the locomotive and tender units of which are unattached and are free to move independently of each other to provide for the relative movement that takes place between the locomotive and its tender.

The elevator casing 25 inclines upwardly from below the cab floor and extends forwardly to the firing opening 13 of the firebox and is preferably open to and in communication with the lower portion of said opening, which opening as shown is extended downward somewhat below the cab floor in order that the casing will occupy a minimum amount of space within the cab. That portion of the opening 13 above the top cover 28 of the elevator casing 25 may be closed by any suitable or ordinary form of door or closure not shown, which door may be opened for observation of the fire or for other purposes such as hand firing of the fuel.

From the transfer conveyor the fuel is received by the elevator member 11 which comprises an endless belt 31 mounted on the separated rollers 32, 33, the rollers being fixed on shafts or axles 34 and 35 respectively which are journaled in the side walls 26, 26a of the elevator casing 25 at different elevations. The rear roller shaft 34 is lower than the forward roller shaft 35 and disposed below the conduit 20 of the transfer conveyor so that the endless belt elevator slants downward from its highest point adjacent to the firing opening 13 and is in a position to receive by gravity the fuel from said conduit. Cross bars are angles 36 which are secured to the belt 31 in any desired manner such as by staples or rivets tend to prevent the fuel from rolling backward along the belt and increase its efficiency in elevating the fuel and discharging or projecting it into the firebox.

The angle of inclination is such that with a predetermined rate of revolution of the endless elevator 11, sufficient momentum will be imparted and direction given to the fuel being delivered therefrom to discharge and project it through the firing opening 13 to the firebox 12 and scatter it over the grates 16, the scattering being effected in cooperation with the deflectors 15, 15a, the form and operation of which will be later described.

At times it is necessary to trim the fire by delivering the fuel to one portion of the fire independently of the others; this, and the fact that fireboxes vary in length makes it necessary that

the discharge of fuel into the firebox may be flexibly controlled, and this is accomplished in the present invention by adjusting the rate of movement of the endless elevator by changing the speed of its drive mechanism to impart the desired velocity to the endless elevator which in turn varies the discharge of the fuel longitudinally of the firebox and which driving mechanism is hereinafter described.

Any motor that will through suitable drive mechanism impart motion of preferably rapid velocity to the endless elevator 11 may be used with this invention. There is shown for this purpose as will appear on Figures 1 and 2, a motor or if desired a turbine 37 supported as by the bracket 38 to the firebox backwall 14. The motor shaft has mounted thereon a sprocket wheel 39 meshing with an endless chain 40 which is trained over a sprocket wheel 41 of desired proportions and ratio and which is fixed on the roller shaft 35 exterior of the casing 25 for driving the roller 33 and thus through frictional or if desired, but not shown, sprocket connections drive the endless belt 31.

The fuel is discharged from the elevator through the opening 13 in the form of a thin layer or ribbon-like stream of a width substantially equal to the width of the endless belt and it is spread longitudinally over the firebox, its various particles in proportion to their mass dropping onto different longitudinal portions of the firebed. The lateral distribution of the fuel is controlled by a deflecting means, such as manually adjusted deflectors 15, 15a which are disposed above the elevator 11 and which may be adjusted so that the vane portion of the deflector may be brought into the path of the fuel and so regulated as to control and vary the lateral distribution of the fuel. When two such deflectors are used the distribution to either side of the firebox or to the portions thereof may be varied independently.

The deflecting member 15 or 15a as best shown in Figures 3 and 4 comprises a bar having a flattened vane portion 42 at its forward end, curving toward the side wall of the firebox to which it is adapted to direct the fuel, and on its opposite end is formed a ball or spherical knob 43 which is received in a ball seat 44 of the casing top cover 28 and held therein by a removable lower half of the seat which may be fastened to the cover portion by any securing means. The seat 44 is slotted at 45 to permit the desired movement of the deflector in all directions and is also similarly apertured at 46 to permit movement of the adjusting lever or handle 47 which handle may be threaded or otherwise fixed to the ball or knob portion on the deflector after it is placed within the seat. The movement of the deflectors 15, 15a is indicated conventionally on the drawings above referred to, the arrangement being such that an infinite number of positions of the deflectors can be obtained and they may be held in any desired position independently of each other by suitable and novel locking means.

For this purpose a locking plate 48 is mounted around the handle 47, there being sufficient clearance between the handle and plate, but the minimum amount necessary, to permit the plate to move horizontally on the cover 28 regardless of the direction of movement of the handle. The locking plate 48 is apertured at 49 and 49a, an amount necessary to allow its movement about the locking studs 50, 50a which are in threaded

engagement with the cover 28. Washers 51, 51a are provided on the studs above the locking plate and they are of a size suitable to overlap the apertures 49, 49a in the plate so that portions of the washers will be bearing upon the locking plate 48. By loosening the wing nuts 52, 52a the handle 47 and the locking plate 48 can be moved to the extreme positions of the deflectors 15, 15a in any direction as controlled by the slotted apertures 45 and 46 of the ball seat 44, or the deflectors may be held in any one of infinite intermediate positions by tightening of the wing nuts which through the washers 51, 51a will secure the locking plate 48, the handle 47 and thus the deflecting members 15, 15a in the desired position.

The above construction provides that the deflectors 15, 15a may be adjusted independently and that either may be regulated to assist in controlling the distribution of the fuel as it is being discharged or projected into the firebox by the elevating member 11. Any number of deflectors may be used that will be found suitable for effectively scattering or distributing the fuel over the fire.

From the foregoing description, it will be observed that the feeding of the fuel and the volume being delivered is separate from and controlled independently of the means for elevating, discharging or projecting the fuel into and distributing it over the firebed. This independence of operation and the independent adjustable control of the distributing members all combine to provide a flexibly operated stoker which is highly efficient, simple in construction and operation and which continuously, mechanically conveys the fuel to the firebox and effectively distributes the fuel over the firebed thereof.

I claim:

1. In a locomotive stoker, in combination with a locomotive and a tender therefor, a trough rigidly mounted in the tender, a conveyor casing rigidly secured to said trough and extending forwardly therefrom, fuel conveying means disposed in said trough and conveyor casing, fuel elevating means having its lower end beneath and adjacent the forward end of said conveyor casing and extending forwardly and upwardly therefrom in a substantially straight line, and a casing rigidly secured to the locomotive enclosing said elevating means and the forward end of said conveyor casing, the communicating ends of said elevating casing and said conveyor casing being free to move independently with respect to each other.

2. In a mechanical stoker, in combination with a furnace having a firing opening therein, a conveyor for transferring fuel from a source of supply to a point rearward of said furnace, an elevator extending upwardly and forwardly from a

position immediately beneath the forward end of said conveyor to said firing opening, said elevator being arranged to receive fuel by gravity from the forward end of said conveyor and to convey it to the firing opening, means for operating said elevator at a sufficient speed to project the elevated fuel through said firing opening into said furnace, deflecting means above the path of the projected fuel and extending into the furnace, and means arranged to render said deflecting means adjustable into the path of the projected fuel to a predetermined depth for intercepting the opposite side portions only of the fuel stream and laterally distributing such portions to the sides and back corners of the firebox.

3. In a mechanical stoker, in combination with a locomotive having a firebox with a firing opening therein and a tender therefor, a conveyor on said tender and extending forwardly therefrom to a point rearward of the firebox of said locomotive, a casing on the locomotive communicating at its rearward end with said conveyor and at its forward end with said firing opening, an endless belt elevator mounted within said casing and extending upwardly and forwardly from a position immediately beneath the forward end of said conveyor to said firing opening, means for imparting motion to said endless belt elevator with sufficient velocity to elevate and project the fuel received from said conveyor into the firebox, deflecting means above the path of the projected fuel and extending into the firebox, and means arranged to render said deflecting means adjustable into the path of the projected fuel to a predetermined depth for intercepting the opposite side portions only of the fuel stream and laterally distributing such portions to the side and back corners of the furnace.

4. In a mechanical stoker, in combination, a tender, a locomotive having a firebox with a backwall having a firing opening therein, a conveyor for transferring fuel from said tender to a point on the locomotive rearward of its firebox backwall and beneath the cab floor thereof, an upwardly and forwardly inclined endless elevating means arranged to receive fuel from said conveyor and elevate it to and project it through said firing opening in a ribbon-like stream, deflecting means above said stream and extending into the firebox and means arranged to render said deflecting means adjustable horizontally and vertically into said fuel stream for assisting in the distribution of the fuel, said conveyor and endless elevating means being operated and said deflecting means being adjusted independently of each other.

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