

No. 626,981.

Patented June 13, 1899.

J. DAVIES.

FEEDING DEVICE FOR STEAM BOILER FURNACES.

(Application filed July 20, 1898.)

(No Model.)

2 Sheets—Sheet 1.

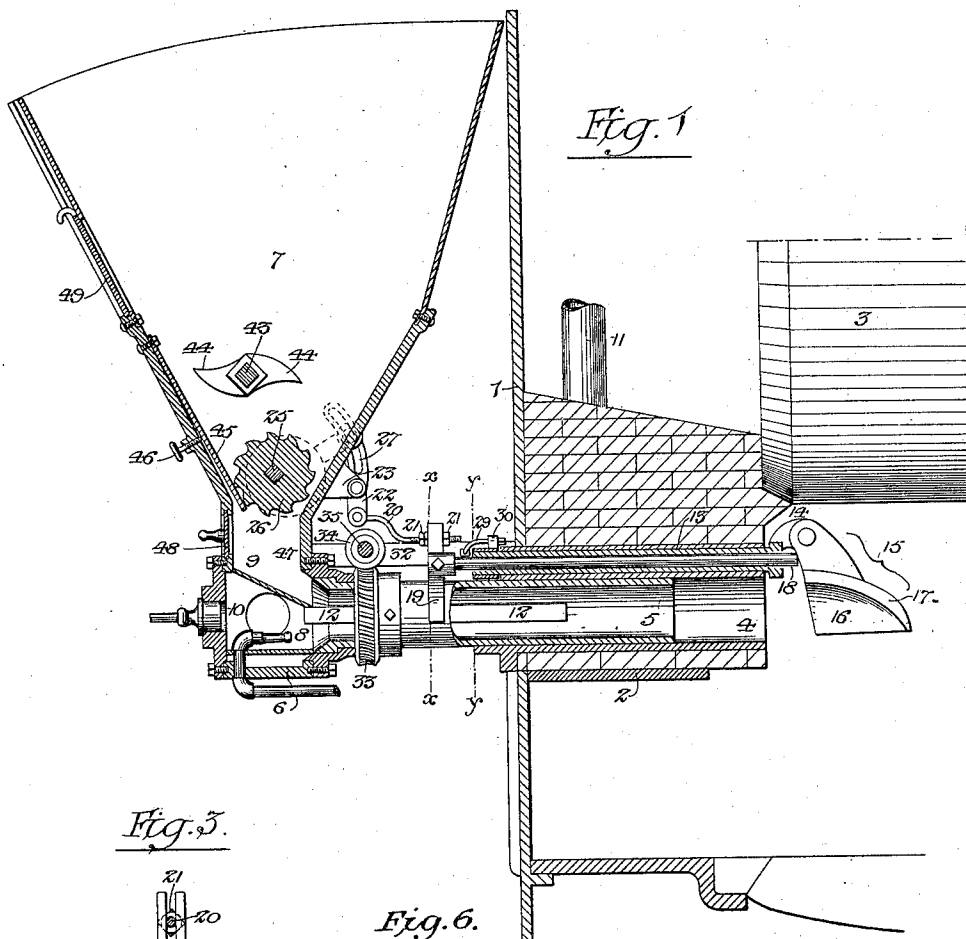


Fig. 5.

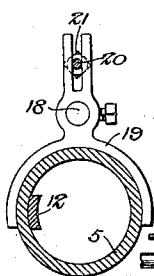


Fig. 6.

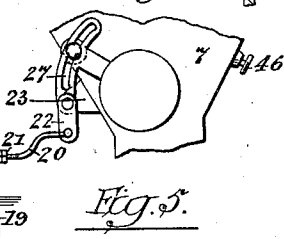
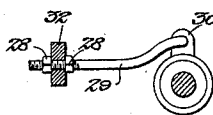


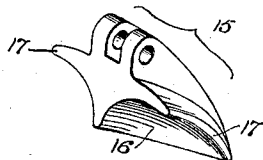
Fig. 7.

Fig. 4.



Witnesses:-

Frank H. Graham.
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Inventor:-

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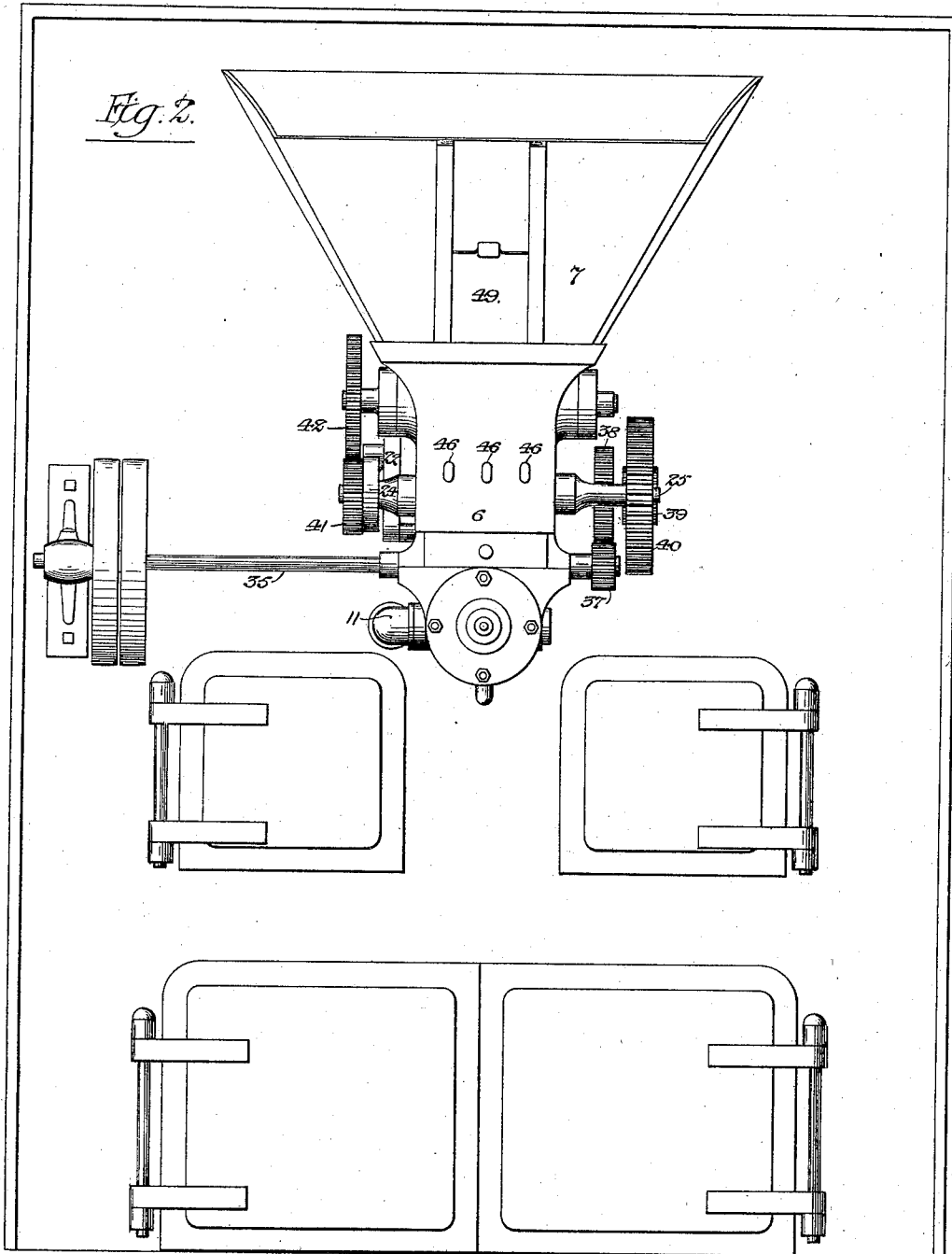
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JOSEPH DAVIES, OF BRIDGEPORT, PENNSYLVANIA.

FEEDING DEVICE FOR STEAM-BOILER FURNACES.

SPECIFICATION forming part of Letters Patent No. 626,981, dated June 13, 1899.

Application filed July 20, 1898. Serial No. 686,478. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DAVIES, a citizen of the United States, and a resident of Bridgeport, Montgomery county, Pennsylvania, have invented certain Improvements in Feeding Devices for Steam-Boiler Furnaces, of which the following is a specification.

My invention consists of certain improvements in the fuel-feeding device for furnaces for which I obtained Letters Patent No. 524,579, dated August 14, 1894, my present improvements relating both to the mechanism for preparing the coal for the action of the feeder and to the feeder itself and having for their object the better control of the preparation of the fuel and the more effective feeding of the same into and distribution of the same in the fire-box of the furnace.

In the accompanying drawings, Figure 1 represents a longitudinal sectional view of sufficient of a steam-boiler furnace to illustrate my fuel-feeding device in connection therewith. Fig. 2 is a front view of the same. Fig. 3 is an enlarged transverse section of part of the device, taken on the line *xx*, Fig. 1. Fig. 4 is an enlarged transverse section of another part of the device, taken on the line *yy*, Fig. 1. Fig. 5 is a perspective view of a deflector or distributor forming part of the apparatus, and Fig. 6 is a detail hereinafter referred to.

1 represents the front plate of the furnace, and 2 the plate for the support of the transverse masonry structure at the front of the fire-box, against which the front end of the boiler 3 abuts or upon which it is partially supported. Built into said masonry structure of the furnace is a tubular casing 4, which is adapted for the reception of the rotating feed-tube 5, the latter being mounted at the front end in a suitable bearing in a cap-plate of the blast-box 6, which is secured to the lower end of the fuel-hopper 7, said blast-box having a nozzle 8, whereby a jet of super-heated steam or other propulsive agent is projected from the lower portion of the blast-box into the lower portion of the feed-tube 5, where it meets the ground or pulverized coal flowing from the hopper 7 and carries the same through the feed-tube 5 and casing 4 into the fire-box by the furnace.

The ground or pulverized fuel is prevented from falling directly onto the nozzle 8 by means of a transverse partition 9, extending across the blast-box and inclined downwardly toward the feed-tube, so that the fuel will flow from the same into the forward end of said feed-tube and into the blast entering the same.

The blast-box may be supplied either with cold air, hot air, unconsumed products of combustion, or a mixture of these, a suitable plugged opening 10 in the blast-box providing for the inflow of cold air and a pipe 11 extending from the blast-box back into the smoke-box of the furnace providing for the supply of hot air or unconsumed products of combustion, the pipe being coiled in the smoke-box, carried through one of the flues of the boiler, or otherwise disposed so as to present an extended surface to the products of combustion when it is desired to use it as an air-heater.

Secured at its forward end to the blast-box structure is a bar 12, which extends into the feed-tube 5 and bears against one side of the same, as shown in Fig. 3, so that as the tube is rotated said bar will act as a scraper and prevent moist fuel from adhering to and becoming caked upon the inner surface of said feed-tube. Hence the latter cannot become obstructed or partially obstructed by such caked fuel, but will present at all times an opening of full area for the feeding of fuel to the furnace.

In the upper portion of the casing 4 is a longitudinal opening to which is adapted a tube 13 free to turn in said opening and having at its inner end a projecting bracket 14, to which are hung suitable ears upon the back of a distributor 15, which occupies a position immediately in the path of the fuel projected into the furnace from the fuel-tube 5. This distributor resembles in shape the double mold-board of a plow—that is to say, it comprises a central rib 16 and opposite downwardly and outwardly flaring wings 17, so that the fuel thrown against it by the feed-tube is directed not only downward onto the grate of the fire-box, but is spread laterally, so as to be carried outwardly toward each side of the fire-box, thus effecting a more uniform distribu-

tion of the fuel over the grate than can be effected by a simple flat plate, such as shown and described in my prior patent.

In order to still further enlarge the area over which the fuel can be spread, I impart to the duplex distributor 15 a longitudinal swinging motion, so that the angle of the downwardly-extending wings 17 of the distributor in respect to the mass of fuel projected against them is constantly changing with the effect of correspondingly changing the distribution of the fuel longitudinally in the fire-box. Thus when the distributor swings upwardly and rearwardly the fuel will be directed farther back toward the rear of the fire-box than when the distributor swings forwardly and downwardly, as will be readily understood.

The reciprocation of the distributor 15 is effected by means of a rod 18, which passes through the tube 13 and either bears upon or is connected to the distributor at its inner end, while at its outer end it is connected to a yoke 19, mounted upon the feed-tube 5 and having a slotted lug to which is adapted a rod 20, having nuts 21 on opposite sides of said lug, as shown in Fig. 1, said rod being connected to one arm of a lever 22, which is hung to a bracket 23 on the hopper 7 and is vibrated by means of an eccentric 24 upon a shaft 25, which passes through the fuel-hopper and carries a toothed grinding-disk 26, to which reference will hereinafter be made, the eccentric-sleeve having an arm with pin adjustable in a slot 27 in the lever 22, so that the throw of the latter, and consequently the extent of the swinging motion of the distributor 15, can be regularly regulated, the opposite extremes of movement of the distributor being also subject to change by manipulating the nuts 21 so as to effect longitudinal movement of the yoke 19 in respect to the rod 20, as shown in Figs. 1, 3, and 6. By reason of these adjustments the fuel can be distributed in any part of the fire-box desired.

It is desirable to provide for laterally swinging the distributor 15 in order that the relation of the same to the column of fuel discharged from the feed-tube 5 may be varied to meet the requirements of any particular case, and in order to effect such lateral adjustment of the distributor I swing the tube 13 in its bearing in the casing 4 by manipulating nuts 28 upon a rod 29, which is connected at one end to a lug 30 on a head at the front end of the tube 13 and passes through a bar 32, forming one of the supports for the blast-box and fuel-hopper.

The feed-tube 5 has secured upon it a worm-wheel 33, which meshes with a worm 34 on a transverse shaft 35, which is adapted to suitable bearings in the bar 32 and in a bracket 36, secured upon the front plate 1 of the furnace, said shaft 35 having fast and loose pulleys for the reception of a belt whereby the shaft may be driven from any available source of power. The shaft 35 also has

a pinion 37, which meshes with a spur-wheel 38 on a sleeve which is free to turn on a stud projecting from the fuel-hopper, and on this sleeve is a pinion 39, which meshes with a spur-wheel 40 on the shaft 25, which carries the toothed grinding-disk 26, before referred to, said shaft 25 having at the opposite end the eccentric 24 and a spur-pinion 41, which meshes with a spur-wheel 42 on a shaft 43, the latter extending transversely across the fuel-hopper and having blades or teeth 44, which serve to crack or break up large lumps of fuel before the same are subjected to the action of the toothed grinding-disk 26. The said grinding-disk operates in conjunction with a plate 45, secured at its upper end to the inner side of the flaring front of the hopper, but free at the lower end, so that it can be adjusted from or toward the toothed periphery of the grinding-disk 26, thereby causing the latter to grind fine or coarse, as desired, such adjustment of the plate 45 being effected by a series of set-screws 46, bearing upon the plate and adapted to threaded openings in the front of the fuel-hopper, as shown in Fig. 1.

The fuel-hopper terminates at the bottom in a neck 47, and an opening in the front of this neck is closed by a slide-plate 48, which can be readily removed when it is desired to gain access to the neck for purposes of inspection or to dislodge any fuel which may have accumulated therein.

A sliding plate 49 in the front of the upper portion of the fuel-hopper provides a convenient means of access to the breaker 44 or other parts in the lower portion of said fuel-hopper.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of means for projecting a mass of fuel into a fire-box, with a duplex distributor having downwardly and outwardly flaring portions on each side of a central line whereby a lateral as well as a longitudinal distribution of the fuel will be effected, substantially as specified.

2. The combination of means for projecting a mass of fuel into a fire-box, with a distributor mounted in the path of said projected mass of fuel, and provision for swinging said distributor laterally so as to vary its relation to said moving mass of fuel, and means for imparting longitudinal vibration to said distributor, substantially as specified.

3. The combination of means for projecting a mass of fuel into a fire-box, a distributor located in the path of said moving mass of fuel, a hanger carrying said distributor, a bearing for said hanger, and means for swinging said hanger in the bearing, substantially as specified.

4. The combination of means for projecting a mass of fuel into a fire-box, a distributor located in the path of said moving mass of fuel, a hanger for said distributor, a bearing

in which said hanger is mounted so as to be capable of swinging or turning, a rod passing through said hanger and acting upon the distributor so as to effect vibration of the same, and means for imparting reciprocating motion to said rod, substantially as specified.

5. The combination of means for projecting a mass of fuel into a fire-box, a swinging distributor located in the path of said moving mass of fuel, a rod acting on said distributor, a yoke connected to said rod, an operating-rod having a longitudinal adjustment in respect to said yoke, and means for imparting reciprocating motion to said operating-rod, substantially as specified.

6. The combination of means for projecting a mass of fuel into a fire-box, a swinging distributor interposed in the path of said moving mass of fuel, a rod for imparting swinging movement to said distributor, and mechanism for reciprocating said rod, one of the elements of said mechanism being a slotted lever whereby the extent of reciprocating movement of the rod can be regulated, substantially as specified.

7. The combination in a fuel-feeding device for furnaces, of a feed-tube, means for rotating the same, an air-blast and fuel-supply chamber communicating with said tube, and a scraper located on the inside of the rotating tube and serving to prevent accumulations of fuel thereon, substantially as specified.

8. The combination in fuel-feeding device for furnaces, of means for projecting fuel into the fire-box, a fuel-hopper, a grinding device in the lower portion of the same, and a toothed breaker rotating in the hopper above said grinding device, whereby large lumps of fuel are cracked or broken by said breaker before they are subjected to the action of the grinding device, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH DAVIES.

Witnesses:

C. D. HESS,
HARRY WADE.