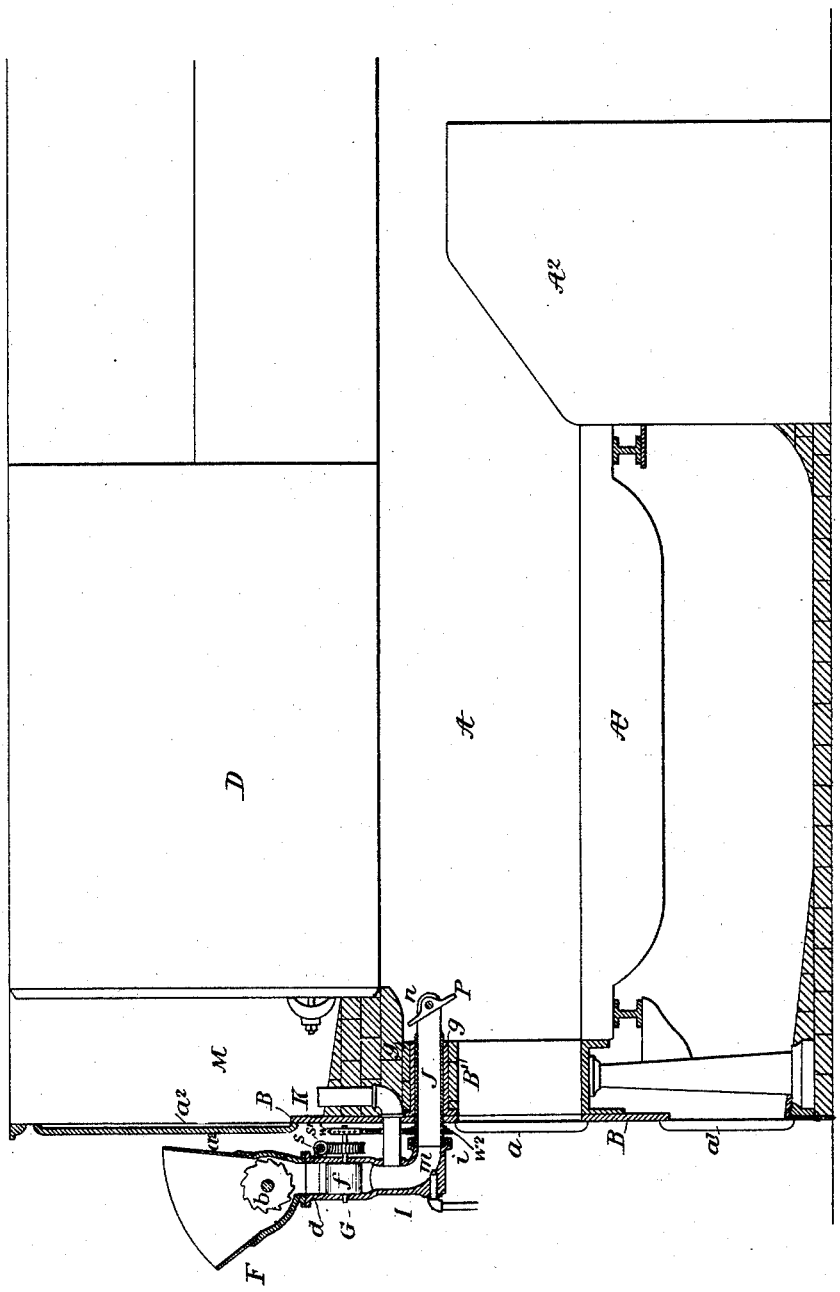
(No Model.) 2 Sheets—Sheet 1.

J. DAVIES.

FUEL FEEDING DEVICE.

No. 524,579. Patented Aug. 14, 1894.

FIG. 1.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 4

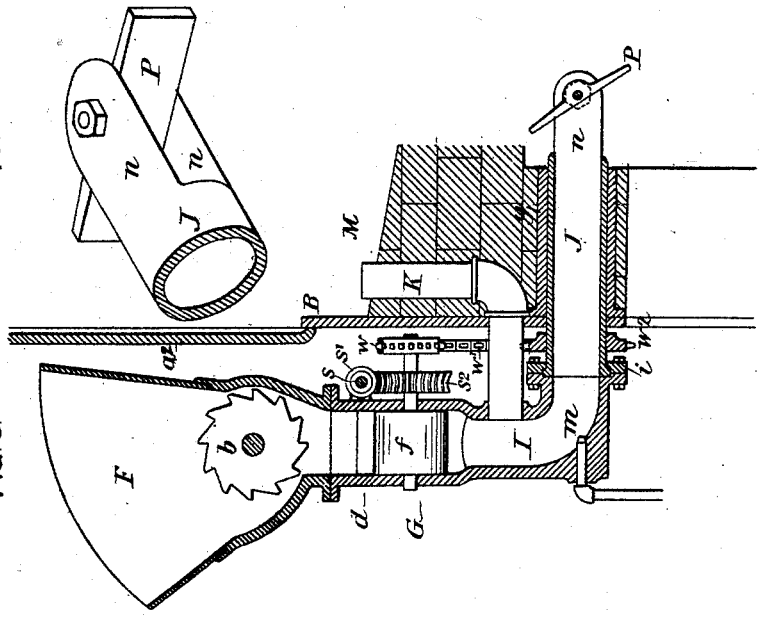
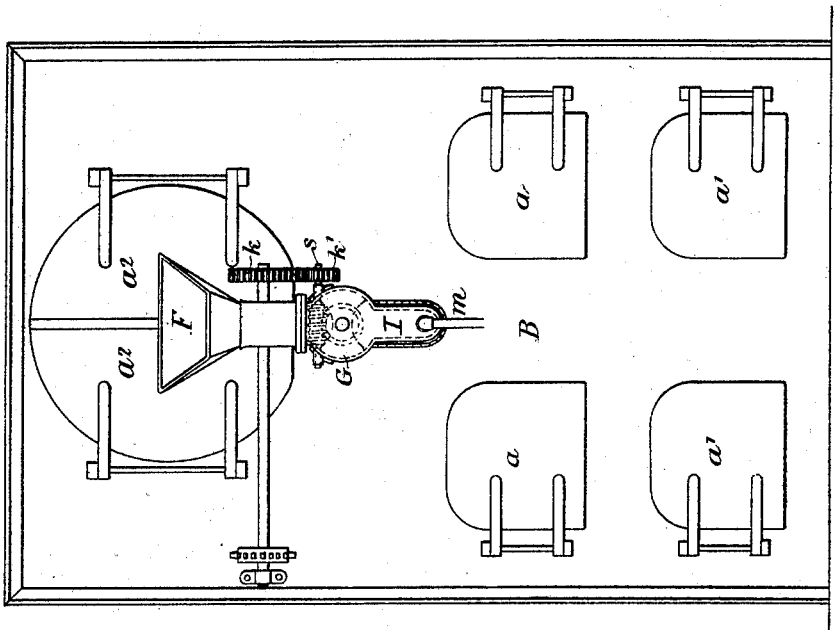


FIG. 3

FIG. 2



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UNITED STATES PATENT OFFICE.

JOSEPH DAVIES, OF BRIDGEPORT, PENNSYLVANIA.

FUEL-FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 524,579, dated August 14, 1894.

Application filed January 29, 1894. Serial No. 498,298. (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 Fuel-Feeding Devices for Furnaces, of which the following is a specification.

The object of my invention is to construct an efficient form of automatic stoker for furnaces in which the fuel, in powdered or fine granular form, is forced into the fire box and distributed throughout the area of the grate, provision being also made for withdrawing unconsumed products of combustion from the smoke box and conveying them into the fire box with the fresh fuel.

In the accompanying drawings:—Figure 1, is a view partly in section and partly in elevation, of a steam boiler furnace provided with automatic fuel-feeding devices in accordance with my invention. Fig. 2, is an enlarged sectional view of the fuel-feeding device detached from the furnace. Fig. 3, is a front view on the same scale as Fig. 1; and Fig. 4, is a perspective view of part of the device.

A represents the fire box of the furnace, A′ the grate, A^2 the bridge wall, B the front plate, B′ the front arch, D the boiler, *a* the usual fire doors, *a′* the ash pit doors and a^2 the smoke box doors in front of the boiler flues.

Suitably mounted upon the front plate of the furnace is the automatic fuel feeding device, which consists of the hopper F, a measuring box G, a conveyer pipe I and a distributer pipe J, these parts being constructed and operated as follows:

The hopper F has in the lower portion a toothed crushing or breaking roll *b* which, in the case of bituminous coal or fuel in large lumps, serves to reduce the same to pieces of the proper size before permitting them to pass through the neck *d* into the measuring box G which contains a rotary measuring valve *f* having opposite pockets, which, as said valve is rotated, alternately receive the fine coal from the hopper and discharge it into the conveyer pipe I which is curved forward at its lower end and communicates with the outer end of the distributer, the latter consisting of a pipe J mounted in a suitable bearing *g* on the inner side of the front plate B so that it is free to turn therein, a flange at the front end of said pipe J being longitudinally confined to a flange upon the conveyer pipe I by means of a grooved ring *i* so that the distributer pipe is free to turn.

Projecting into the lower portion of the conveyer pipe I and discharging into the front end of the distributer pipe J is a nozzle *m* which is supplied with superheated steam from any available source, the jet from the nozzle serving to forcibly propel or discharge into the fire box the fine granular fuel delivered to the conveyer pipe by the measuring valve *f*.

A pipe K leads from the upper portion of the conveyer pipe I to the smoke box M of the furnace so that the draft caused by the action of the jet from the nozzle *m* serves to induce unconsumed products of combustion from the smoke box to flow through said pipe K and into the conveyer pipe, from which they are forced with the fresh fuel into the fire box, to be there ignited and consumed.

The distributer pipe J is cut away at its inner end so as to leave two projecting fingers *n* and to these fingers is pivoted a deflector blade P against which the fine granular fuel forced through the pipe J impinges and is thereby scattered in a broad, thin sheet into the fire box, the deflector blade being adjustable so that its angle may be changed and the distribution of the fuel in the fire box regulated, thus, the nearer the angle of the blade approaches a right angle in respect to the axial line of the pipe, the closer will the fuel be confined to the front of the fire box, and the more nearly the angle of the blade approaches parallelism with the pipe, the further will the fuel be thrown toward the rear of the fire box. Suitable nuts on the ends of the pivot shaft of the blade P serve to secure the same in any desired position of adjustment.

The shaft of the crusher *b* has at one end a spur wheel *k* which meshes with a pinion *k′* on a shaft *s′* located in the rear of the measuring box G, and having a worm *s′* which meshes with a worm wheel s^2 on the shaft of the measuring valve, so as to drive the same at the desired reduced speed. The shaft of the measuring valve is also provided with a sprocket wheel *w* which receives a

chain w', the latter being also adapted to a sprocket wheel w^2 on the distributing pipe J, so as to effect the rotation of the same and insure the scattering of the granular fuel throughout the fire box.

When it is desired to render the device automatic in its action, the operation of the shaft of the crusher b can be governed by the usual damper regulator, so that when the pressure of steam reaches a predetermined point the rotation of said shaft will be stopped, and the further feeding of fuel to the fire box will be arrested until the pressure is reduced.

The joint between the hopper F and the neck d is so located that, when said hopper is removed, the smoke box doors a^2 can be readily opened in order to gain access to the smoke box flues and man-hole of the boiler without disturbing any of the operative parts of the apparatus.

The above described apparatus provides for the use of coal in very small grains and thus opens a market for many thousands of tons of coal which are now regarded as waste, while owing to the small size of each unit of fuel, and to the thorough distribution of the fuel throughout the entire fire box, very effective combustion of the fuel is insured so that, in connection with the provision for returning to the fire box such unconsumed products of combustion as may find their way to the smoke box, the device in its operation is practically smokeless.

Although I prefer to use a jet of superheated steam as a means for forcing the fuel through the distributer, a jet of air, under sufficient pressure, and preferably heated, may be substituted therefor, if desired.

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

1. The combination in fuel feeding devices for furnaces, of a fuel conveyer, a distributer pipe forming a continuation of the same and projecting into the furnace, the inner end of said pipe being cut away at opposite points so as to form projecting fingers, means whereby the fuel is forced through the conveyer pipe and into and through the distributer pipe, and an inclined deflector plate hung to the projecting fingers at the inner end of the distributer pipe and extending across said pipe, substantially as specified.

2. The combination, in fuel feeding devices for furnaces, of a fuel conveyer pipe, a distributer pipe forming a continuation of said conveyer pipe and projecting into the fire box, a deflector at the inner end of said distributer pipe, means for rotating said pipe, and means for forcing the fuel from said conveyer pipe into and through the distributer pipe, substantially as specified.

3. The combination, in fuel feeding devices for furnaces, of a fuel conveyer, a fuel distributer forming a continuation of said conveyer and projecting into the fire box, means whereby the fuel is forced from the conveyer into and through the distributer, and a pipe forming a communication between said conveyer and the smoke box of the furnace so as to provide for the return of unconsumed products of combustion to the fire box, substantially as specified.

4. The combination in fuel feeding devices for furnaces, of a hopper, a fuel measuring box having a rotary valve, a conveyer pipe communicating with said measuring box, a distributing pipe forming a continuation of said conveyer pipe and projecting into the furnace, a deflector at the inner end of said distributing pipe, and a jet nozzle discharging into the forward end of the pipe, substantially as specified.

5. The combination in fuel feeding devices for furnaces, of the conveyer pipe having a forcing jet nozzle, a rotary distributer pipe, a measuring box having a rotary valve, a feed hopper having a rotary crusher, a shaft having a worm meshing with a worm wheel on the valve shaft, gearing connecting said worm shaft and the shaft of the crusher, and gearing whereby the rotary distributer pipe is driven from the shaft of the measuring valve, substantially as specified.

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

JOSEPH DAVIES.

Witnesses:
WILLIAM A. BARR,
JOSEPH H. KLEIN.