

No. 730,884.

PATENTED JUNE 16, 1903.

L. K. DAVIS.
FUEL FEEDING APPARATUS.
APPLICATION FILED MAR. 12, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

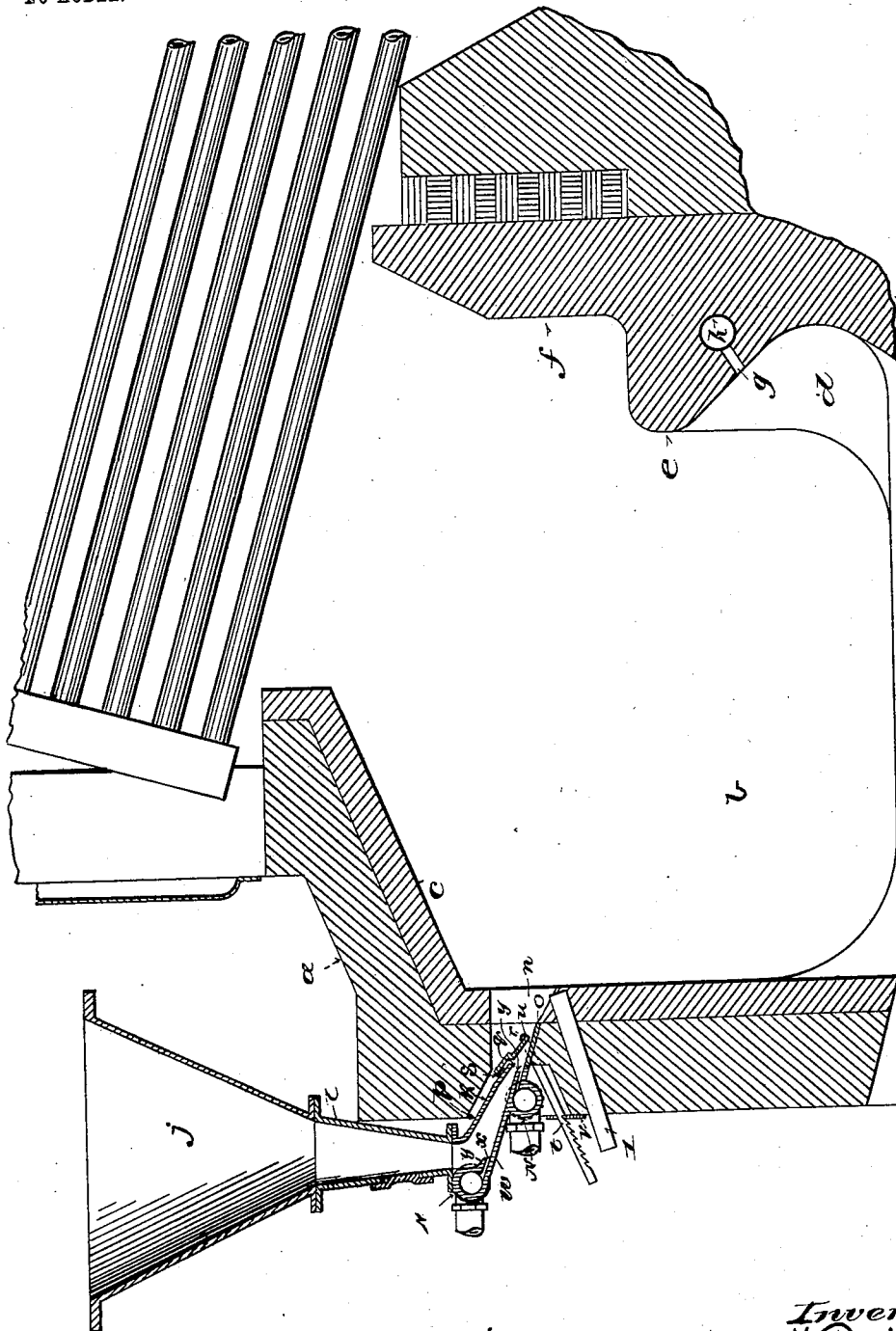


Fig. 1.

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L. K. Davis.
by *[Signature]* atty

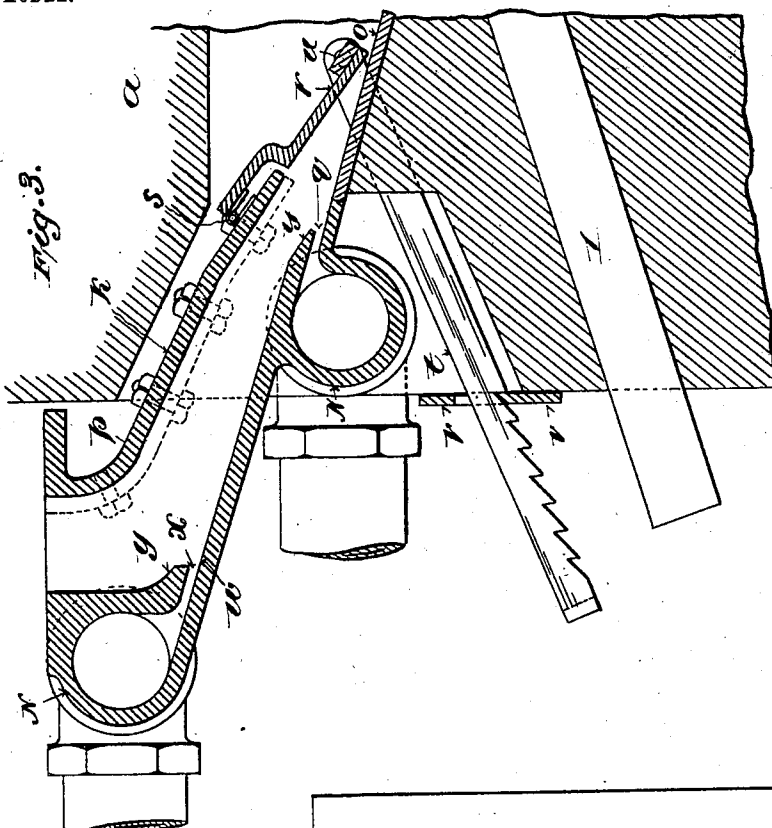
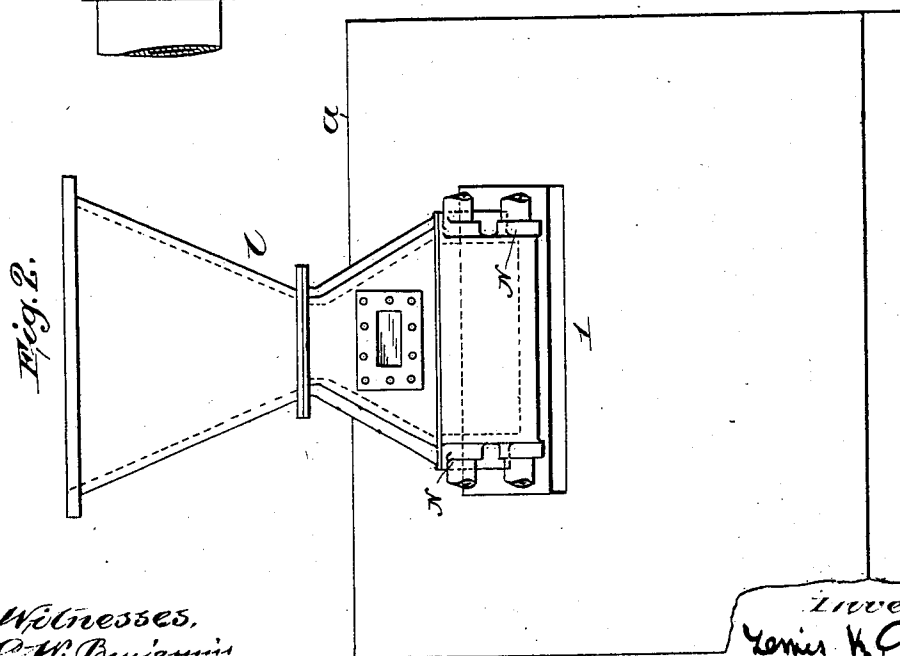
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UNITED STATES PATENT OFFICE.

LEWIS K. DAVIS, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO GRACE P. DAVIS, OF INDIANAPOLIS, INDIANA.

FUEL-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 730,884, dated June 16, 1903.

Application filed March 12, 1902. Serial No. 97,880. (No model.)

To all whom it may concern:

Be it known that I, LEWIS K. DAVIS, a citizen of the United States, residing at and whose post-office address is 113 Monument Place, Indianapolis, Indiana, have invented certain new and useful Improvements in Fuel-Feeding Apparatus, of which the following is a specification accompanied by drawings.

My invention relates to fuel-feeding apparatus for furnaces, but more particularly to apparatus for feeding fine fuel, as coal or coke, coal-dust, and the like.

The object of my invention is primarily to improve upon apparatus heretofore devised for evenly distributing fine fuel in furnaces through the agency of fluid under pressure, as air or steam.

My improvements relate to that class of fuel-feeding apparatus utilizing fuel-feeding nozzles for the distribution of the fuel into the furnace through the agency of fluid under pressure.

Further objects of my invention will hereinafter appear in the accompanying specification.

To these ends my invention consists in means for carrying out the above objects; and it further consists in fuel-feeding devices having the general mode of operation substantially as hereinafter fully described, and shown in the accompanying drawings, in which—

Figure 1 is a sectional side view of a furnace and fuel-feeding devices embodying my improvements. Fig. 2 is a front elevation of the furnace and fuel-feeding devices, and Fig. 3 is a sectional side view of a nozzle embodying my invention.

Referring to the drawings, *a* represents a furnace, which may be of any suitable character; but in this instance a furnace is shown provided with a combustion-chamber *b*, having an upwardly-sloping top portion *c*, extending from the front of the furnace, and a hollowed portion or pocket *d* at the rear and bottom of the combustion-chamber. That portion of the furnace *e* extending over the pocket *d* extends a substantial distance toward the front of the furnace from the rear furnace-wall *f*, thereby giving the section of

the furnace the conformation as illustrated in Fig. 1. Preferably a twyer *g* is arranged to discharge fluid under pressure downwardly into the hollowed portion or pocket *d* of the combustion-chamber, and means are provided for leading fluid under pressure to said twyer, as a pipe *h*. Fuel is led to the furnace-entrance from a suitable hopper *j*, communicating with a nozzle *k*, by means of the passage-way *l*. The entrance *n* of the furnace may be of any suitable size and shape adapted to my improved fuel-feeding nozzle *k*. According to my invention the nozzle is arranged in the entrance of the furnace in such a manner that it discharges into the furnace at an angle, as shown, the nozzle discharging fuel and fluid under pressure downwardly into the combustion-chamber *b*, although this precise arrangement is not essential in all uses of my improved nozzle. The nozzle may be formed of metal shaped as desired, and it is adapted to be connected to the passage *l* in any suitable manner, as by bolts. As shown in Fig. 2, the nozzle extends substantially across the entire front of the furnace, or, in other words, is what may be termed a "flat nozzle," as distinguished from a round nozzle, although certain features of my invention are equally applicable to round nozzles, and I do not desire to limit myself in all cases necessarily to a flat nozzle. The lower portion *o* at the mouth of the nozzle, as shown, rests upon the front wall of the furnace, and the top portion or plate *p* of the nozzle extends downwardly over the lower portion *o*, forming a mouth *q* between the portions *o* and *p*. The mouth of the nozzle is preferably provided with a deflector or lip *r*. (Shown in this instance as adjustable.) The angle of the lip *r* with the remainder of the nozzle may be varied in any suitable manner, so that the mouth *q* may be entirely closed or opened to the desired extent, and the lip *r* acts as a deflector, since the entering fuel and fluid under pressure is necessarily directed in its passage to the combustion-chamber of the furnace by the lip *r*, according to its position. While any suitable means may be provided for adjusting the deflector or lip *r*, as shown, said deflector is hinged to plate *p* at *s*, and a notched rod *t* is

connected at one end *u* to the deflector *r*, while a stop *v* is adapted to hold the rod *t* and deflector *r* in any desired position.

According to my invention improved means
5 are provided for leading the fluid under pressure to the nozzle *k*, as shown, the nozzle being provided with a plurality of lateral apertures for the entrance of the fluid under pressure, it being understood, however, that
10 but one lateral aperture may be used, if desired, without departing from the spirit of my invention, since, as will be hereinafter seen, the principle of operation is the same in any case. Preferably the lateral apertures
15 are arranged in the bottom *w* of the nozzle and extend transversely across the nozzle and are so arranged that entering fluid under pressure will be directed toward the mouth of the nozzle. In order to accomplish
20 this end, the lateral apertures, or what may be termed "transverse slits" *x* in the bottom portion of the nozzle, are provided with lips *y*, whereby the entering fluid is directed toward the mouth of the nozzle. Means are
25 provided for leading fluid under pressure to said slits *x*, as shown, piping *N* being provided extending transversely to the nozzle, said piping communicating therewith by means of the apertures or transverse slits *x*.
30 The fuel, as shown, descends from the hopper into the nozzle from above, while according to the arrangement of apertures *x* the fluid under pressure is forced through the bottom of the nozzle beneath the entering
35 fluid and toward the mouth of the nozzle, whereby the fuel is discharged therefrom with great force and the tendency is to spread the fuel rather in the form of a sheet in the combustion-chamber. The extent and direction of discharge of the fuel is then regulated
40 by means of the adjustable deflector *r*.

As auxiliary to the nozzle *k* I preferably provide a twyer *l*, arranged beneath the nozzle and directed upwardly at an angle there-
45 to for discharging fluid under pressure into the furnace at an angle to the discharge of the nozzle. This twyer *l* may or may not be used, as desired, and its function is to aid in distributing the fuel.

50 By the arrangement of nozzle and distributing-twyer as shown in Fig. 1, in combination with the conformation of the rear or back wall of the combustion-chamber *b*, provided with a discharge-twyer *g* for fluid under pressure, I am enabled to obtain almost complete
55 combustion of the fuel in the combustion-

chamber, and the entire chamber is heated throughout all its portions, thereby increasing the efficiency of such furnaces in a very large degree.

I am not to be understood as limiting myself to the construction shown in the accompanying drawings and herein described.

Obviously some features of my invention may be used without other features and embodied in widely-varying forms. For this reason and without enumerating equivalents I claim, and desire to obtain by Letters Patent, the following:

1. In a fine-fuel-feeding device, a flat nozzle having a downwardly-inclined and gradually-contracting passage through which the fine fuel may flow from the hopper, and having also a lateral aperture opening into the said passage in the bottom thereof, and means exterior to said passage for delivering fluid under pressure through said aperture, substantially as set forth.

2. In a fine-fuel-feeding device the combination of a furnace, a flat nozzle having a downwardly-inclined passage through which the fine fuel may flow, and having also a plurality of lateral apertures opening into said passage at the bottom thereof, one in advance of the other, and means for delivering fluid under pressure through said apertures, substantially as set forth.

3. In a fine-fuel-feeding device, a flat nozzle having a downwardly-inclined passage through which the fine fuel may flow, and having also a lateral aperture opening into the said passage in the bottom thereof, an adjustable deflector at the delivery end of said passage in advance of said aperture, and means for delivering fluid under pressure through said aperture, substantially as set forth.

4. In an apparatus for feeding fine fuel, the combination of a furnace, a nozzle having an adjustable deflector at one side of the furnace and means for forcing fluids under pressure together with fine fuel through the nozzle into the furnace, and a twyer at the opposite side of the furnace for additionally supplying air under pressure to the combustion-chamber of the furnace.

Signed this 8th day of March, 1902, at New York.

LEWIS K. DAVIS.

Witnesses:

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