(No Model.)

T. H. LUCAS.

GRATE.

No. 277,754. Patented May 15, 1883.

Fig. 1.

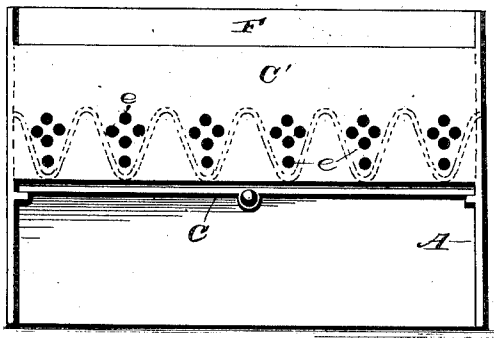


Fig. 2.

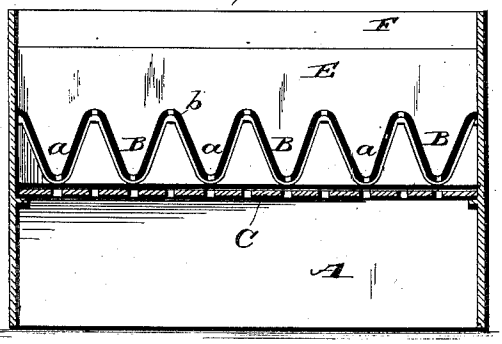


Fig. 3.

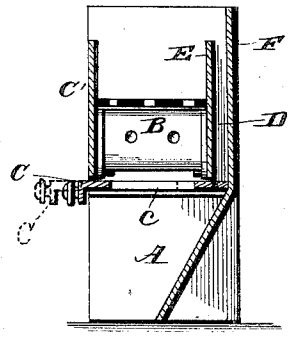
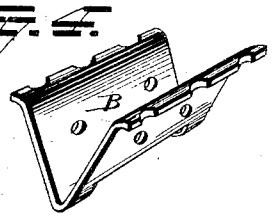


Fig. 4.



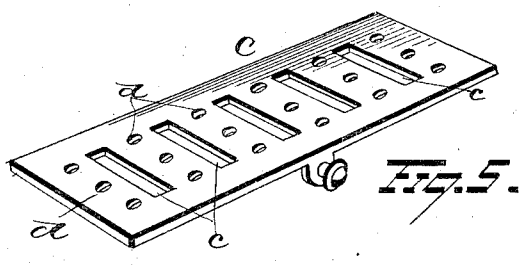


Fig. 5.

WITNESSES

G. F. Downing.

S. G. Nottingham.

INVENTOR

Thomas H. Lucas.

By Hall Symmons.

Attorney

UNITED STATES PATENT OFFICE.

THOMAS H. LUCAS, OF VALLEY CITY, DAKOTA TERRITORY.

GRATE.

SPECIFICATION forming part of Letters Patent No. 277,754, dated May 15, 1883.

Application filed March 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. LUCAS, of Valley City, in the county of Barnes and Territory of Dakota, have invented certain new and useful Improvements in Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in grates more particularly adapted for burning lignite, or the soft coals of the Northwest. Heretofore the great difficulty encountered in economically utilizing the softer coals consisted in defective grates, which were so constructed as to allow the particles of coal to fall through as the lumps crumbled or became decomposed, and also from their shape allowed the mass to settle down solidly thereon, which prevented the free ingress of air. Lignite in burning produces a large amount of ashes, and it has been found practically impossible to remove them from the grates now in use without removing the finer particles of unconsumed coal formed by the crumbling of the lumps when the latter are exposed to the heat; and the object of my present invention is to provide a grate capable of holding the coal while burning, and with pockets or receptacles, into which the ashes and finer particles of coal fall. A further object is to provide means for supplying air to the burning fuel in and above the pockets. A further object is to provide means whereby the ashes and finer particles of fuel that have fallen into the pockets are removed without disturbing the burning fuel above the pockets; and with these ends in view my invention consists in the parts and combinations of parts, as will be more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in front elevation of my improved grate as applied to a stove. Fig. 2 is a similar view with the face-plate removed. Fig. 3 is a transverse vertical sectional view. Fig. 4 is a detached perspective view of a section of the grate, and Fig. 5 is a perspective view of the sieve or shaker.

A represents a stove of any desired design or construction, and the grate formed in one or more pieces and secured within the stove or within a furnace in any desired manner. This grate is preferably made of cast metal, and when secured in position a series of pockets, *a*, is formed, into which the ashes and finer particles of fuel fall. The grate is preferably made in sections, each of which is V-shaped in cross-section, the side edges of the said sections being placed side by side, with the open or large ends or bases presented either upward or downward, the formation or shape of the grate being the same in both instances. The upper ends or apices, *b*, of the sections or grate-bars are all in the same horizontal plane, and are, preferably, about two inches apart at their upper ends, so as to support the lumps or larger pieces of lignite above the pockets, so as to enable the flames and heat to play around them, and also to allow of the free entrance of air below the lumps, thereby facilitating combustion. Each pocket is about one inch and a quarter deep, and is provided at its lowest point with a slot or with a series of perforations, through which the ashes pass when the shaker or sieve is moved. The sides and top of the grate-bars are provided with numerous perforations for the entrance of air, and by continuing the perforations to the top of the grate-bars perfect combustion is obtained until the pockets or receptacles are completely filled with ashes, which latter can then be removed by the shaker or sieve C. This shaker or sieve C is preferably made of one piece of metal; but when my improvement is applied to large furnaces it will be found convenient to make them in sections. This shaker rests close up under the grate-bars, and is provided with a number of slots or perforations, which come immediately under the oblong slot in the lower ends of the pockets or receptacles, and is also provided with large openings *c* between each set of perforations *d*, to enable the fine ashes which drop through from the top and sides of the pockets to fall at once into the ash-pan. This shaker C is supported in any suitable manner, and in the present instance is adapted to be moved backward and forward; but it can, without materially altering the relative arrangement of parts, be moved endwise or partly rotated and perform its function in a satisfactory manner. The direction of movement of the shaker, however, is largely dependent on the shape of the stove.

The face-plate C′ is made in a separate piece, and is adapted to cover and protect the outer ends of the grate-bars, and is provided near its lower edge with a series of perforations, *e*, which latter open into the pockets *a*, for the purpose of increasing the draft. D is an air-flue situated between the rear plate, E, and plate F. This flue extends down even with the bottom of the grate-bars, and upward about or slightly above a level of the fuel. The draft of this flue is regulated by the shaker or sieve C, the inner end of which is adapted to move under the flue more or less and wholly or partly close it, to increase or decrease the draft, as circumstances demand. The secondary current of air which passes up this rear flue is discharged above the burning fuel, and increases the combustion by supplying oxygen to the gases set free by the combustion of the coal.

To remove the ashes which have settled into the pockets it is simply necessary to agitate the shaker or sieve, which movement is sufficient to loosen them and cause them to fall through the perforations therein.

The grate-bars, instead of being made V-shaped, as described, can be cast in one continuous piece, or they can be formed of flat perforated bars of metal placed in inclined positions and held in place by flanges on the front and rear plates, B and F.

I have described my improvement in connection with a simple cooking-stove, but it is equally well adapted for all stoves and furnaces in which lignite is burned.

It is evident that slight changes in the construction and relative arrangement of parts might be resorted to without departing from the spirit of my invention; and hence I would have it understood that I do not limit myself to the exact construction shown and described, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a stationary grate, the perforated sections composing the same being shaped and arranged, substantially as described, so as to form ash-pockets, of a shaker situated close up under the grate, substantially as set forth.

2. The combination, with a stationary grate the sections of which are shaped and arranged, substantially as described, so as to form ash-pockets, the sides and bottoms of said pockets being perforated, of a perforated shaker situated close up under the grate, substantially as set forth.

3. The combination, with a stationary grate composed of a series of perforated V-shaped sections arranged side by side, forming a series of V-shaped pockets, of a shaker situated close up under the grate, substantially as set forth.

4. The combination, with a stationary grate composed of V-shaped sections arranged side by side, forming a series of V-shaped pockets, and a face-plate provided with perforations opening into the pockets, of a movable shaker situated close up under the grate, substantially as set forth.

5. The combination, with the plate C′, plate E, and intermediate grate, of the rear plate, F, forming the flue D, and a shaker situated close up under the grate, substantially as set forth.

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

THOMAS H. LUCAS.

Witnesses:
GEO. F. DOWNING,
GEORGE COOK.