

H. B. VAN BENTHUYSEN'S IMPROVEMENTS IN BASE-BURNING STOVES.

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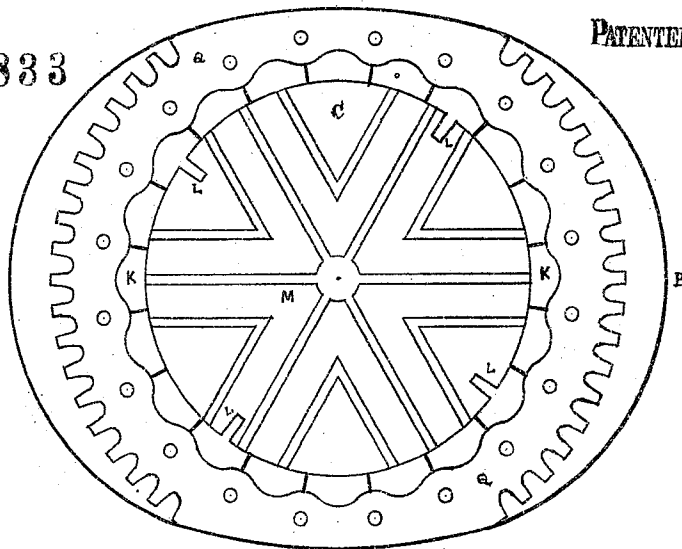


Fig. 1.



Fig. 4.

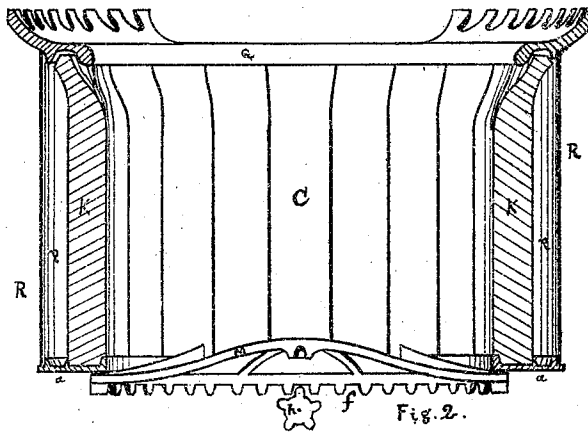


Fig. 2.

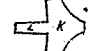
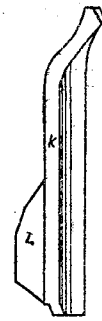


Fig. 5.

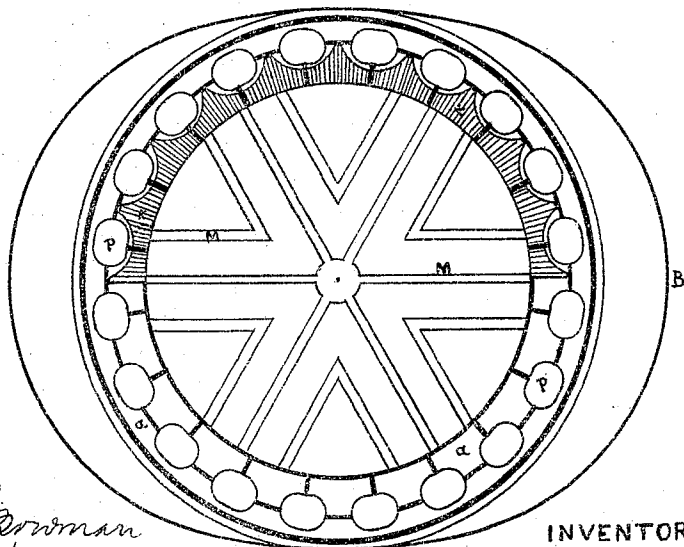


Fig. 3.

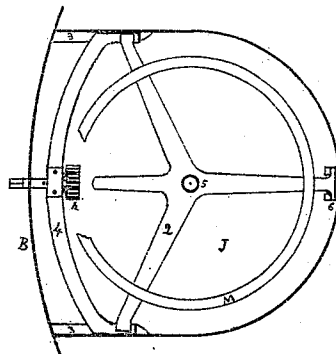
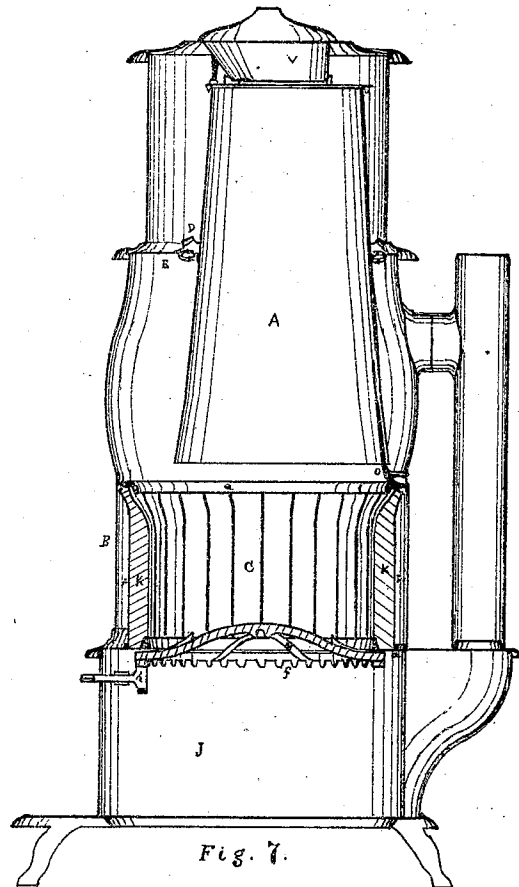
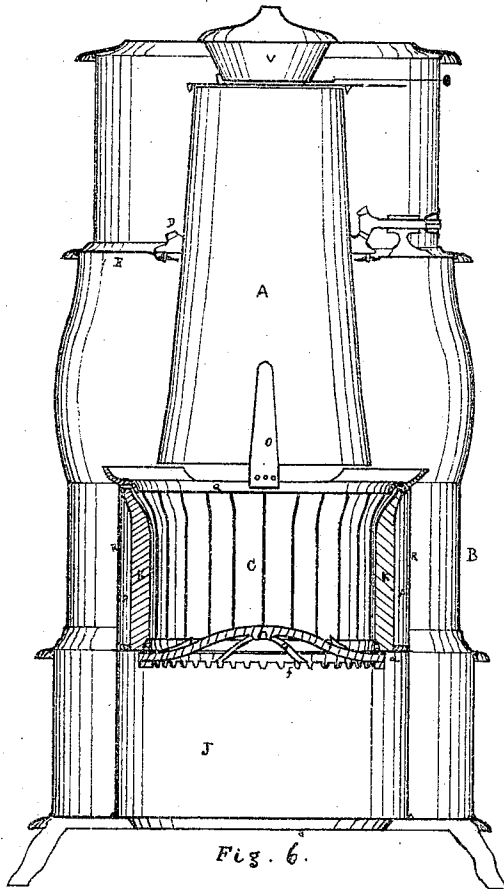
WITNESSES,

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UNITED STATES PATENT OFFICE.

HENRY B. VAN BENTHUYSEN, OF LOCKHAVEN, PENNSYLVANIA.

IMPROVEMENT IN BASE-BURNING STOVES.

Specification forming part of Letters Patent No. 117,833, dated August 8, 1871; antedated August 3, 1871.

To all whom it may concern:

Be it known that I, HENRY B. VAN BENTHUYSEN, of Lockhaven, in the county of Clinton and State of Pennsylvania, have invented certain Improvements in Base-Burning Stoves, of which the following is a specification:

The nature and object of my invention are to make such improvements in base-burning stoves and furnaces as will insure a more perfect combustion of the fuel used and a continuous fire; to provide against the escape of dust, ashes, smoke, or gas into the rooms heated; to prevent the overheating and consequent destruction of the ornamental and illuminated casing, and thereby render the stove more sightly and durable; and also to render the heat radiated of a more agreeable and healthful character. An open fire exposed to the atmosphere on all sides usually gives off less smoke—less of the fuel in a gaseous form escapes combustion—than when the fire is confined in an ordinary stove with air admitted only at one side or beneath. This fact is particularly noticeable with bituminous coal when a quantity of fresh coal is placed on top of the burning mass in the ordinary way; but with a base-burning stove rightly constructed this waste is mostly overcome. Yet there are two reasons, at least, why the fire-chamber in base-burners should approximate to an open fire as nearly as may be without injury to the radiation of heat, or detriment to other portions of the stove, or the continuation of the fire. The first is that bituminous coal requires more atmospheric air in its combustion to make a clear fire than does anthracite coal. The second is that in order to have the fuel (bituminous or anthracite coal) burn a long time without attention it is necessary that air should reach the fire so long as one wishes to keep it alive, or so long as there is any fuel unconsumed. With a common fire-chamber the accumulation of ashes upon the grate soon cuts off the supply of air and causes the fire to go out. But with my double-walled fire-chamber air is freely admitted on all sides, as well as beneath, and cannot be interrupted till the fire-chamber is quite filled with ashes—hence a slow fire may be kept for a great number of hours; and an ample supply of air is admitted for the combustion of bituminous coal when a high degree of heat is desired.

My invention relates to improvements in my

base-burning stoves patented December 15, 1868, and February 1, 1870, which, by a series of experiments, I have brought to a higher degree of perfection, as illustrated by the accompanying drawing, in which—

Figure 1 is a top view of the fire-chamber C, showing the cap-piece Q surrounded with curved fingers to prevent the coal falling over into the flues defined by the outer casing B and the perforations for the passage of air upward; also, the grate M and the projecting wings or ribs L L. Fig. 2 is a vertical section of the fire-chamber from side to side through the center, showing the external cylinder or wall R, the internal wall of staves K K, the air-space *p p* between the walls, the open base-plate or ring *a*, the grate M, the pinion *h*, and the cap-piece Q. Fig. 3 is a top view of the open base-plate or ring *a*, showing on the lower half the seats for the staves, and on the upper half a sectional view of the staves K, and the manner in which they are placed, so as to leave openings between them for a free passage of air to the interior of the fire-chamber; also, the openings P P for the admission of air outside the grate, the grate M, and the outer casing B. Fig. 4 is a front and sectional view of a single stove. Fig. 5 is a side and sectional view of a stove having a projecting wing, L, for breaking up the slate and cinders when the grate is operated. Fig. 6 is a sectional elevation from side to side of a base-burning stove, showing the arrangement of the several parts and the relation of the fire-pot to the other portions of the stove. Fig. 7 is a sectional elevation of a base-burning stove from front to back, showing the relation of the fire-pot to the external casing when the casing forms in part or wholly the outer wall of said fire-chamber. Fig. 8 is a top view of the ash-pit J, showing the grate-hanger 2, with center-pin at 5, hinged at 6, two arms resting on the dumping-bar 4, which bar rests on the fins 3 3, and by drawing this bar forward the grate M and hanger 2 are allowed to dump.

My patented magazine A is suspended loosely, so as to be moved alternately or rotated against the stationary coke-breaker O in order to insure the feeding down of bituminous coal. The lower portion of said magazine may be made stationary, while the upper portion is movable, with the coke-breaker attached to it and extending downward

so as to travel around inside the stationary portion. This arrangement will produce the same result—viz., the loosening up and separating the coking coal immediately in contact with the ignited fuel contained in the fire-chamber. I make the staves forming the inner wall of the fire-chamber shorter than the external wall and loose in independent seats, allowing room for expansion as well as free circulation of air. I make the staves narrow in order to dispense with the perforations described in my patent No. 99,375, and increase the number of "loose" or open joints in lieu of said perforations, making the staves more durable and easier to manufacture. Each stave is nearly surrounded by a current of air, which renders the interior of my fire-pot more durable.

I do not limit myself to any particular shape or size of stave, but purpose making them of such form and weight as will best withstand the action of heat for the longest period of time.

A solid fire-pot of iron soon warps and cracks by repeated expansions, and brick linings soon break and crumble out; but a fire-wall of narrow cast staves protected by air will not be so seriously affected by intense heat as to crack or break or get out of shape in a long time. The main object of admitting air freely to the fire through the entire depth of the fire-chamber is to furnish a full supply of oxygen for the combustion of bituminous coal, and also to continue the combustion of this and anthracite coal for a long time, despite the accumulation of ashes upon the grate. This device keeps up the combustion without attention till nearly all the fuel in the fire-pot and magazine is consumed. The several parts of my double-walled fire-pot are held together with bolts or rods independently of the stove, and the whole adapted to the seat and space it is intended to occupy within the casing of the stove, and is held in place by a lug or the foot of the coke-breaker O secured to the outer casing, and is convenient for transportation alone to supply the place of such as may be worn out, while the exterior of the stove remains in good condition.

I do not limit myself to the circular form of fire-pot; but make my fire-chamber of any desired shape or size suited to the form of stove or furnace in which it is to be placed.

My grate I denominate a "power grate," because it is operated by a crank and pinion, and its elevated bars, in combination with the projecting ribs in the fire-pot, crush all slate and cinders so effectually that they pass through the grate and allow a continuous fire to be kept the

entire season, obviating the necessity of dumping the grate in order to free it from the ordinary obstructions.

I construct my grate so that the outer or encircling ring *f*, Fig. 2, does not come within range of the inner diameter of the fire-pot C, but lies wholly under the base-plate *a*, in order not to obstruct the passage of air to the fire nor the descent of ashes and slate from the fire-pot to the ash-pan. I make my grate convex for the purpose of compelling all slate and cinders at or near the center to pass toward the periphery and downward through the openings, if the pieces are not too large, or, if large, to be caught between the V-bars and ribs and crushed, and for the purpose of supporting the body of the burning coal above the crushing apparatus. Cinders accumulate mostly at the outside edge of the mass of burning coals; hence the importance of having the crushing apparatus at that point in order to remove them quickly without waste of coal.

I am aware that rotary and alternating motions as applied to stove-grates are old devices, and I disclaim them, except as combined with a grate of peculiar and novel construction. I am aware that my previous patents, referred to above, embrace some of the leading features set forth in this specification; and I therefore disclaim them in this connection, except as they appear in new forms and in combination with the improvements, as described.

What I do claim, and desire to secure by Letters Patent, is—

1. A rotary or alternating magazine-stove, having an improved fire-chamber composed of the wall B, staves K, ring *a*, cap Q, wings L, one or more, and grate M, arranged and combined substantially as and for the purposes set forth.

2. A convex rotary or alternating grate, having its outer ring outside the interior diameter of the fire-pot, in combination with a fire-chamber wall or lining composed of narrow cast staves, arranged substantially as and for the purposes set forth.

3. Elevating a part of the grate-bars or alternate radial bars above the principal bars, in combination with one or more projections on the inner wall of the fire-chamber.

4. The grate-hanger 2, dumping-bar 4, fins 3 3, and pinion *h*, as arranged for dumping the grate, substantially as set forth.

HENRY B. VAN BENTHUYSEN.

Witnesses:

GEO. D. BOWMAN,
JOS. PARSONS.