A. C. RAND'S IMPROVEMENT IN COAL BURNERS

No. 119,718. Patented Oct. 10, 1871.

FIG. I.

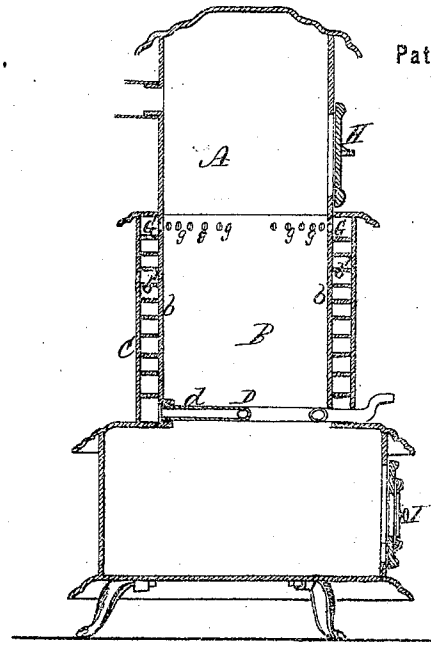


FIG. III.

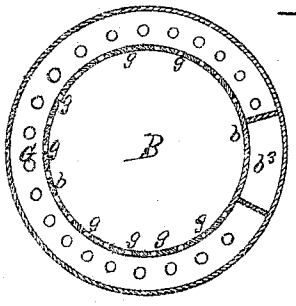


FIG. IV.

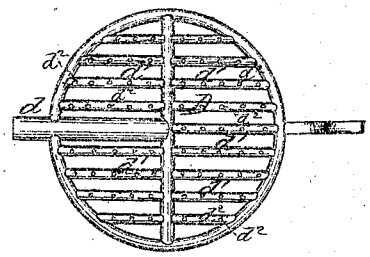
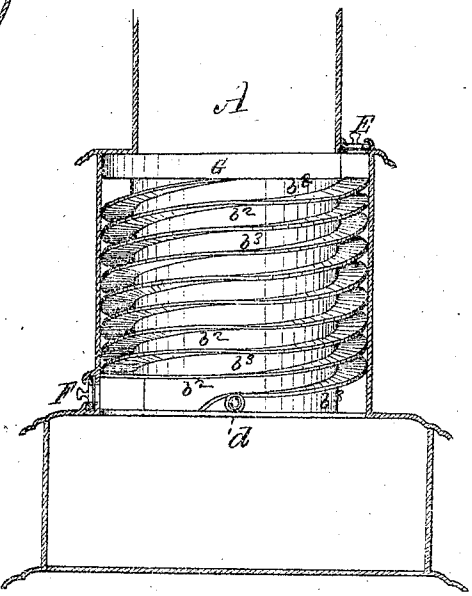


FIG. II.



Witnesses
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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

ALONZO C. RAND, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN HEATING-STOVES.

Specification forming part of Letters Patent No. 119,718, dated October 10, 1871.

To all whom it may concern:

Be it known that I, ALONZO C. RAND, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Coal-Burners, of which the following is a specification:

This invention relates to heating the air which supports the combustion of coal in a stove or furnace of any kind; and consists in conducting said air one or more times around the fire-pot and in distributing it evenly to the coal, in the manner hereinafter described.

In the drawing, Figure I is a vertical cross-section of a plain cylinder-stove with my device for heating the air applied thereto. Fig. II is a similar view of the outer casing, but showing the spiral passages and upper distributing-compartment in elevation, the plane of section being opposite to Fig. I. Fig. III is a horizontal cross-section in plane of line *x x*, Fig. I; Fig. IV, a bottom view of the grate.

A is a plain cylinder-stove, provided with a cast-iron fire-pot, B, which has a plain interior surface, *b*, and flanges or shelves arranged in the form of a double spiral or screw. Around the fire-pot, and in close contact with the corrugations, is an outer cylinder or jacket, C. The spirals are so formed as to afford two separate air-passages, b^2 b^3, between the ridges of the corrugations and the outer cylinder C. D is the grate, formed with a hollow axle, *d*, and hollow bars d^1 d^1, pierced through their under surface with small holes d^2. E is the damper, through which air is supplied to feed the coal in the grate D. F is the damper which admits air to the inclosed space G, and thence through the small holes *g g* to the portion of the fire-box immediately above the coal. H is the door through which coal is supplied to the stove. I is a close-fitting door, by which the ashes, &c., are removed.

The operation of the invention is as follows: The dampers E and F are first closed, and the fire is then started in the usual way by placing kindlings and coal on the grate D and igniting them through the door I. After the coal is lighted the door I is closed tightly and the damper E opened wide. The requisite air for combustion will then be drawn in through the damper E and downward through the air-passage b^3, circling around the fire-pot B, in conformity with the spiral, and at length entering in a highly-heated state the hollow axle *d*, whence it is distributed through the small holes d^2 in hollow bars d^1 to the incandescent fuel. When the draught has become well established the lower damper F is opened and air allowed to pass up the spiral passage b^2 to the distributing-compartment G, and so through the small holes *g g* into the body of the fire-box, to assist in the more complete combustion of the gases and vapors arising from the heated fuel beneath. When the combustion becomes too rapid, as it soon will by aid of the heated air, the upper damper E is entirely closed, thus excluding the further admission of air beneath the burning coal. The lower damper F remains open as before, to supply the necessary oxygen for the complete combustion of the gases arising from the fire beneath. When it is necessary again to urge the fire the upper damper is again opened and allowed to remain so until the fire burns as rapidly as is desired, when it is closed once more, as before.

The principal advantage secured by my invention is the very important one of a more complete combustion than is possible in stoves and furnaces as heretofore arranged. The air which is fed to the fuel coming in contact with the highly-heated surface of the fire-box and grate-bars becomes greatly expanded and its capacity for a chemical union with the carbon of the coal largely increased. The result is rapid combustion, which also involves combustion at a high temperature, and, therefore, and in that degree, more perfect. As the gases arising from the burning fuel are fed with a fresh supply of heated oxygen, there is no opportunity for the said gases to cool and condense into the condition of smoke; but the combustion is continued and completed at a high temperature and no smoke is formed. The whole device is simple in construction and principle, and is adapted to almost every description of stove or furnace, and especially to locomotive-engines.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The distributing-compartment G, in combination with one or more spiral flues for supplying air heated in the manner described to the gases arising from burning coal.

2. The hollow grate D, with its axial passage *d*, in combination with the spiral air-passage b^3, as specified and shown.

3. The air-heating and distributing-device, as a whole, consisting of the spiral air-passages b^2 b^3, the dampers E F, the distributing-compartment G, the hollow grate D with its tubular axle *d*, all arranged and operating substantially as shown and set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

A. C. RAND.

Witnesses:
GEO. W. MIATT,
J. C. GREIFENHAGEN. (154)