

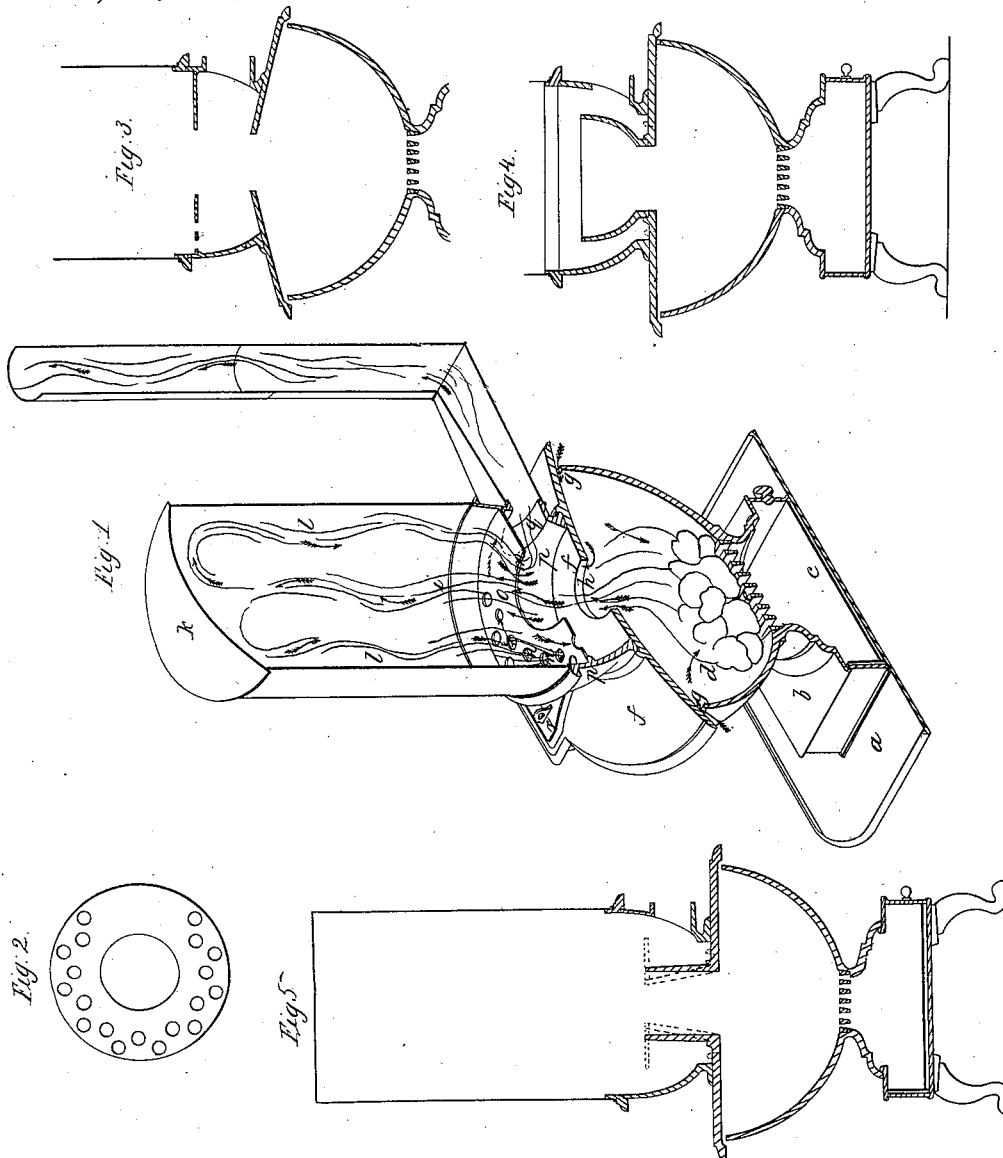
Sheet 1-2 Sheets.

J. Cole.

Heating Stove.

N^o 6,824.

Patented Oct. 30, 1849.



Sheet 2-2 Sheets.

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Heating Stove.

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Fig. 6.

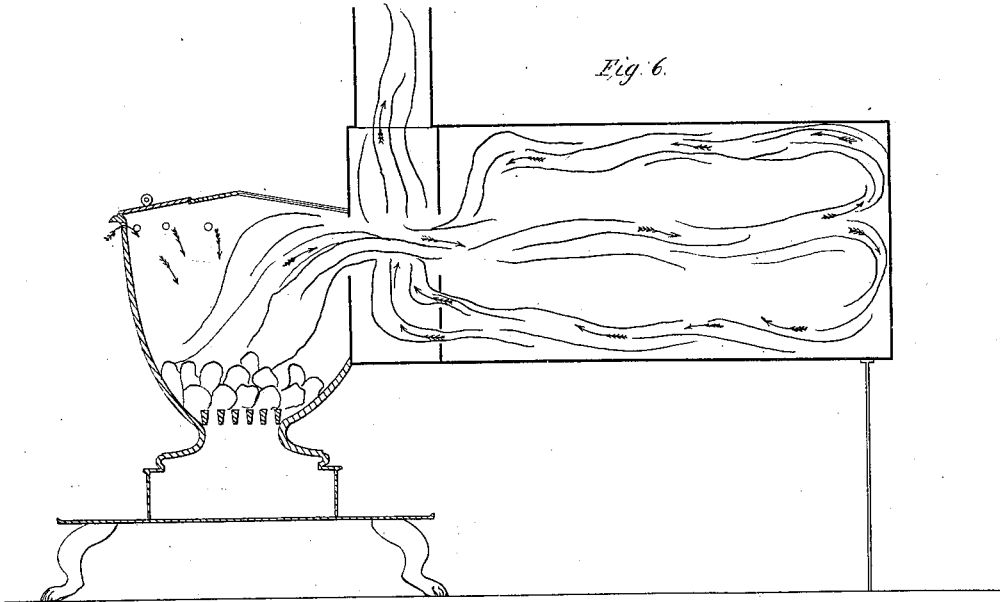
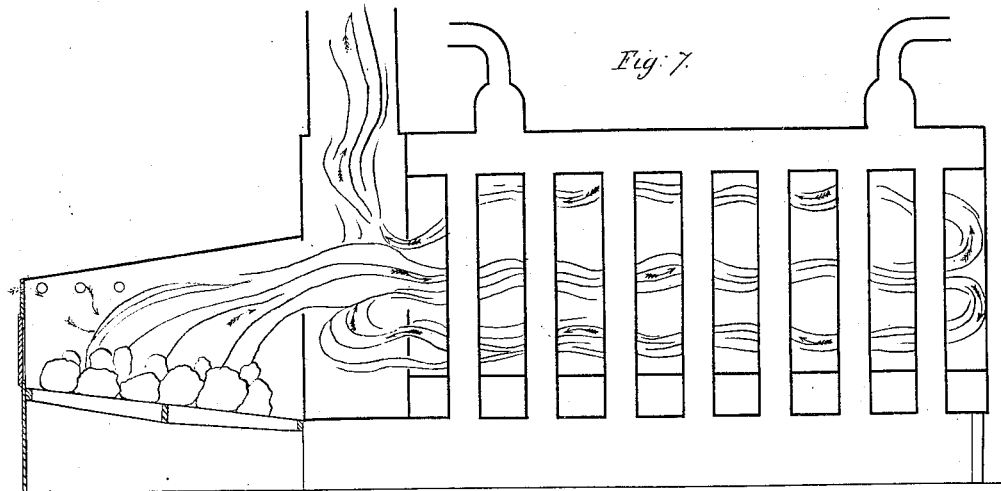


Fig. 7.



UNITED STATES PATENT OFFICE.

JAMES COLE, OF CINCINNATI, OHIO.

IMPROVEMENT IN STOVES.

Specification forming part of Letters Patent No. 6,824, dated October 30, 1849.

To all whom it may concern:

Be it known that I, JAMES COLE, of Cincinnati, Hamilton county, Ohio, have invented new and useful Improvements in Stoves or Furnaces for Culinary or Heating Purposes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is an isometric and sectional view of the stove. Fig. 2 is a top view of the disk forming the upper orifice through which the results of combustion ascend to the roof of the reverberating chamber, and also dividing the reverberating chamber from the discharging-chamber and pipe. Fig. 3 represents in section another shape for the roof of the fire-chamber and one for the bowl of the discharging-chamber similar to that in Fig. 1. Fig. 4 represents in section another mode of applying the same principles, and Fig. 5 also represents two other modes of effecting substantially the same object, the upper edge of the throats having a flange or annular disk attached thereto. Fig. 6 represents the plans for a horizontal radiator. Fig. 7 represents a mode of surrounding the drum with an air-jacket and passing the atmospheric air there-to through tubes passing through the reverberating drum.

It has long been known that a great deal more fuel has been consumed in the attainment of any desired calorical effects than was necessary or should have been used for the purpose, whether a furnace, heating-stove, radiator, or cooking-stove were the requisite means for producing the result in view. This surplus consumption of fuel has been usually submitted to because no invention had come to light that promised a feasible remedy or exhibited a cheap, durable, and practicable mode of extracting more heat from a less quantity of fuel than was ordinarily accorded.

To effect the desired saving of fuel and economically to consume all the combustible matters and gases therein contained or therefrom evolved in the burning of the same, I have devised the following modes, as herein described, and practically tested their efficiency.

The nature of the first part of my invention consists in making the point of discharge for a reverberated current of the results of combustion immediately aside of the point of intensest combustion in the primary current thereof by admitting jets of atmospheric air from points sufficiently elevated down into an otherwise-closed fire-chamber and directly upon the burning fuel, so as to bring the air into contact therewith and transfuse it throughout the gases evolved during combustion; and it consists, also, in forcing the heated jets of air and the gases to pass to a reverberating drum through an orifice so restricted and limited that the adjoining end of the drum can be made to constitute a channel around this the point of intensest combustion, by which channel the reverberated current flows around and is brought into close contact with the current rushing out of the fire-chamber, so that any unconsumed combustible gas in the reverberated current is at its lowest degree of temperature, and when it most needs it attracted to, rekindled again, and carried along by and commingled with the current from the fire-chamber at the latter current's highest temperature and inflaming capacity previous to being drawn off by the exit-pipe attached to the said channel, and opening immediately aside of and above or in a horizontal drum below or above the said orifice.

The nature of the other part of my invention consists in prolonging, controlling, and equalizing the passage of the reverberated current to the exit-pipe by inserting a disk or diaphragm at a level immediately above the opening to the exit-pipe, this disk having a central orifice somewhat larger and directly in line with the orifice in the fire-chamber; and being perforated with small holes over three-fifths of its area, or thereabout, on the part over the channel or discharging-chamber opposite the exit-pipe, the part of the disk over the exit-pipe being intact, so that all discharges from the reverberating drum must be made between the current from the fire-chamber and the verge of the central orifice in the disk, except so much as must pass through the perforations in the area of the disk, as before mentioned, the whole being thus made to flow around and by the current

from the fire-chamber as the unequalizing and direct influence of the draft of the exit-pipe is shut off by the disk being left entire in the part resting over the opening for said pipe.

In arriving at the simplicity of arrangement by which I effect the foregoing useful, economical, and needful results I have essayed the use of a bowl-throat, as seen in Fig. 3. I have also tried the cylindrical throat and a conical throat, and also experimented with these devices, having attached a disk to their upper edge, as illustrated by dotted lines in Fig. 4, reducing the supply of air from below the grate to the mere leakage due to the ordinary joints between the castings forming the ash-pan, the chamber holding it, and the fire-chamber, and also throwing jets of air down upon and among the fuel and the flame and gases evolved during combustion. The result has been that the body of the fire is kept sufficiently ignited by the leakages from below the grate-bars, the gases evolved are thoroughly inflamed, and the fuel consumed from the top downward by means of the jets of air thrown among and upon them, and the current therefrom is so heated that it rushes directly to the head of the reverberating drum in a volume of living flame, and after a most thorough subjection to combustion rolls along the sides of the drum, there forming a reverberated current, which, passing into a discharging chamber or channel situated around the intensest point of combustion, is thence carried off by the exit-pipe. In these experiments a throat of cast-iron was used, but this I found not only unnecessary to the protection of the current rushing from the fire-chamber, but absolutely injurious, as it prevented contact between the currents at the very point where contact is most serviceable in producing perfect combustion. The greater tendency of the current from the fire is to pass into the reverberating drum, and this cause effects a rush directly toward the head of the drum, where the gases have greater room to expand, there being no interference during the transit between the two currents other than the power of the highly inflamed and heated current rushing from the fire-chamber to attract to and commingle with itself and inflame any portion of unconsumed combustible gas in the reverberated current, which, from the lowest to the highest point of the current, and from its lowest to its highest degree of temperature, is rendered capable of ignition by being brought into contact with said current from the fire-chamber from the point of intensest combustion up to the top of the drum, the ascending current, when hottest, being thus made to come in contact with the descending current at its coldest portion. The descending current being driven out of the drum by the current from the fire-chamber, (the whole force of which is in full operation as it rushes out,) the exit-pipe furnishes the only egress by which the descending current can escape.

I thus found that the central orifice in the top plate of the fire-bowl should have no prolonged metallic throat whatever surrounding it, and that the exit-pipe should open, as seen in Fig. 3. A new and singular fact is thus illustrated by my invention, and is clearly demonstrated in my radiator or heating-stove—viz., that an orifice can open directly from the cover of the fire-chamber, as aforementioned, and an exit-pipe proceed from the immediate vicinity, aside of and on a level with or above or below the orifice from the fire-chamber, according as the reverberating drum is vertical or horizontal, not only without any detrimental interference between the current from the fire-chamber and the reverberated current being discharged by the drum, but with actual benefit due to their contact where one current was at its lowest and the other at its highest degree of combustion. I found, however, that with the foregoing arrangement the currents traverse the drum and reach the exit-pipe too unequally and rapidly. I therefore devised a plan for separating, by a metallic disk or diaphragm, the reverberating drum from the discharging chamber or channel, and thus prolonging the reverberation of the gases and their passage to the exit-pipe. An orifice of sufficient capacity to permit the passage of both currents, as before explained, is made in the center of the disk, and that portion of it covering the discharging-chamber opposite the exit-pipe is perforated, as also before explained—viz., for the purpose of bringing so much of the currents as pass one another at the central orifice in close contact, controlling and guiding and prolonging the reverberation of the gases and shutting off the direct influence of the draft of the exit-pipe on the reverberated current.

In the annexed drawings, making part of this specification, my invention is illustrated by means of a radiator or heating-stove.

a is the usual hearth, made to surround the chamber *b*, holding the ash-pan *c*. A bowl or other shaped chamber *d* has a grate *e*, forming its bottom, on which the fuel is laid. It will be readily seen that the foot of the bowl has none of the usual openings so common in cannon and other shaped heating-stoves. The only air admitted to the fire through the grate from below is due alone to leakage in the joints between the castings forming the parts. At suitable distances along the edge of the top of the fire-bowl depressions are left, which, when the cover *f* is placed thereon, form holes *g*, by means of which jets of air have access, as before explained. The cover *f* may be shaped as seen in Fig. 3. A central orifice *h* is made therein, and through this opening the inflamed and inflaming gases rush up in a vertical column *i* till they impinge upon the head of the reverberating chamber or drum *k* and spread around till they descend in the current *l* adown the sides of the drum and pass partly through an aperture *m* near

its verge and partly through perforations *n*, made, as before explained, in a disk, partition, or diaphragm used for purposes already explained, and which is placed within and near the top of a second bowl *p*. This second bowl forms what I call the "discharging chamber" or "channel," whether a disk or diaphragm be used or not, as the reverberated current till drawn off by the exit-pipe flows around this channel between the sides of this chamber—viz., the bowl *p*—and the ascending current *i*. I prefer, however, using this disk or diaphragm and leave it unpierced at that portion which overlies the discharge-pipe in order that there may be no undue tendency of the return-draft to that side of the drum from below which the exit-pipe *q* takes its issue.

r is the opening, covered by a door through which the fuel is introduced and the fire managed.

The course of the atmospheric air is indicated by red arrows. The ascending current or currents issuing from the fire-chamber and the descending or reverberated currents of gases are marked by black arrows pointing in corresponding directions.

Fig. 7 represents a plan for adapting my radiator to heating churches, public halls, and other similar buildings. The heated air can be conducted from the pipes opening into the top of the air-jacket.

Having thus fully, clearly, and exactly described the nature, construction, and operation of my invention and improvements in

stoves or furnaces for heating, cooking, or other purposes for which equivalent combinations are suitable, what I claim therein as new, and desire to secure by Letters Patent, is—

1. Concentrating the issue of the gases evolved during combustion as they pass from the fire-chamber into a reverberating chamber and are at that point commingled with jets of air, the said issue or orifice being in the proportion of a circle of one-third (or less) the diameter of the reverberating chamber into which it opens, and combined with an opening for the discharge of the reverberated current, as illustrated in Fig. 1, by the fire-bowl *d*, orifice *h*, drum *k*, and opening *q*, and for the purposes set forth.

2. The disk *o*, inserted immediately above or on a level with the top of the opening *q* for the exit-pipe, and having a central orifice *m* of suitable diameter, and perforations *n*, arranged as described, and for the purposes set forth.

3. The disk *o*, constructed as described, in combination with the orifice *h*, as described, and for the purpose set forth.

4. Locating the opening *q* for the exit-pipe, as described, in combination with the disk *o* and the orifice *h*, in the manner and for the purpose set forth.

JAMES COLE.

Attest:

THOS. G. CLINTON,
JOSEPH CASSIN.