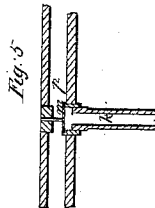
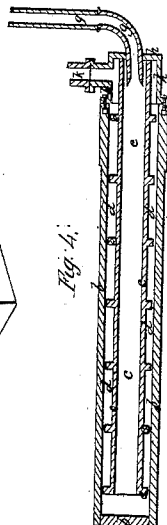
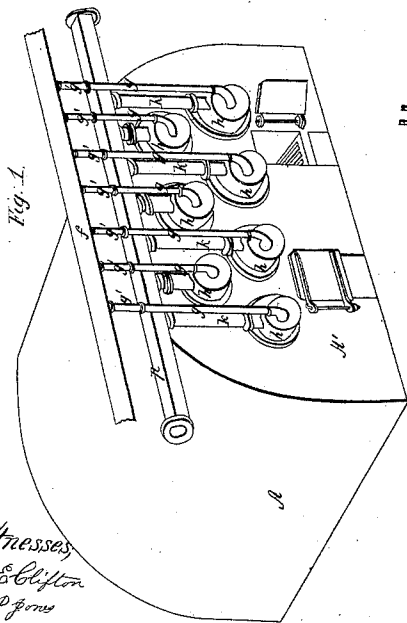
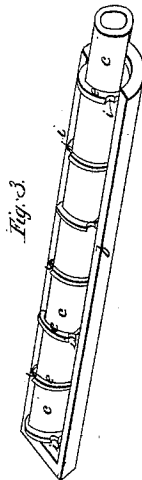
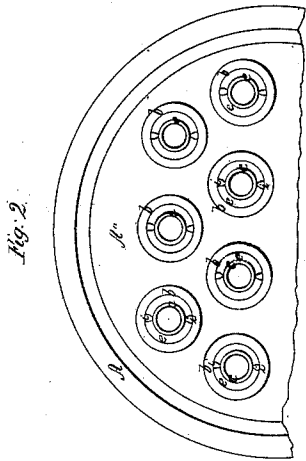


R. E. BROWN.  
HOT BLAST OVEN.

No. 41,421.

Patented Feb. 2, 1864.



Witnesses  
H. E. Clifton  
A. P. Jones

Inventor,  
R. E. Brown

# UNITED STATES PATENT OFFICE.

R. E. BROWN, OF ST. LOUIS, MISSOURI.

## IMPROVEMENT IN HOT-BLAST OVENS.

Specification forming part of Letters Patent No. 41,421, dated February 2, 1864.

### *To all whom it may concern:*

Be it known that I, R. E. BROWN, of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Hot Blasts for Smelting-Furnaces; and I do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon and made to form a part of this specification.

It is a well-known fact that the metallic devices—viz., the heating-pipes, rings, joints, and connections—as ordinarily arranged within hot-blast ovens, are very liable to damage by cracking and giving way under the irregular and excessive heat necessary to produce a suitable hot-blast, and the consequently uneven expansion and contraction of the metal is liable to open and disarrange the joints, which, being within the said ovens, cannot by any possibility be replaced or repaired without stopping the operation of the hot-blast, frequently for a considerable length of time, thus involving much delay and vast expense.

The object of this invention is to obviate the above-named difficulties, to effect great economy in the construction and operation of hot-blast ovens, and also to produce a simple and thoroughly efficient air-furnace for hot-blasts, which, without damage or injury, may sustain a much higher degree of heat than the metallic devices in ordinary use for like purposes; and the nature of my invention relates, first, to the employment of clay or other suitable earthen material in the construction of the pipes, chambers, or vessels employed as air-passages within hot-blast ovens; second, in combination with said pipes or cylinders, to the employment of annular rings or stops; third, in combination with said pipes or cylinders, and with certain reception and delivery pipes, to the employment of certain connecting devices; and, fourth, to the arrangement of certain joints, pipes, and connections with reference to the heating devices within the hot-blast oven, all being constructed and arranged to operate as hereinafter set forth and represented.

In reference to the accompanying drawings, Figure 1 is a perspective view of my improvement. Fig. 2 represents a vertical section,

looking toward the rear of the oven. Fig. 3 is a perspective sectional view representing the arrangement of the heating pipes or cylinders, and also showing the annular rings or stops. Fig. 4 is a vertical sectional elevation, showing specially the connections between the heating-cylinders and the external pipes. Fig. 5 is a sectional view showing the arrangement of a check-valve that may be employed in the delivery-pipe.

A A' A'' represent the walls of the oven, which may be of masonry and suitably lined with fire-brick, as usual in devices for like purposes. Proper openings having suitable caps to cover them will be formed in the rear wall, through which proper devices may be inserted for the purpose of cleaning the heating-cylinders. The heating of the said oven may be effected, as usual, by means of the escaping or waste heat from the smelting-furnace, and also by the use of suitable fuel.

*b* represents a series of heating-cylinders, the front ends of which may be supported by the front wall, A', and their rear ends by means of standards extending from the base of the oven, or by projections extending out from the rear wall, A''.

*c* represents a series of pipes or cylinders, the extreme diameter of which will be somewhat less than the interior diameter of the cylinder *b*, so that when properly arranged for use, as seen in Figs. 3 and 4, suitable spaces, as *d*, may be afforded for the passage of air. The interior cylinders, *c*, will be somewhat shorter than the cylinders *b*, and their rear ends will be open, thereby affording communication between the internal and external cylinders, as distinctly shown in Figs. 3 and 4.

*e* represents the annular rings or stops which are adapted to close the spaces *d* between the cylinders. These stops may be formed as separate parts, or they may be molded with the cylinders *c* in such manner as to form part and parcel thereof. They will be formed with openings or air-passages *i*, and arranged at intervals between the cylinders, as shown. The passages *i* will be formed and arranged so that the line of communication between the chambers *d* (between the stops *e*) will not be direct. The current of air is therefore broken and exposed to even and uniform contact with the heated interior surface of the cylinders *b*, thus

producing the same degree of heat in every particle of the air, and perfecting the efficiency of the hot-blast. The cylinders *b* and *c* and the stop *e* will be formed of clay or other suitable earthen material, fire-clay being preferred. The advantages secured by the employment of said material are very important; and among them may be named economy in construction and great durability, with very little liability to breakage or damage of any kind from continued irregular or excessive heat, capability of withstanding a greater degree of heat than metallic devices for like purposes, and also a tendency to impart a more regular and uniform degree of heat to the air than can be obtained from a heated metallic surface.

*f* represents the pipe from which air may be supplied to the various heating-cylinders of the oven through the medium of the connecting-pipes *g* *g'* and the connections *h*. Said connections *h*, being arranged outside of the oven, may be of suitable metal. They will be provided with suitable flanges and secured to clay cylinders *b* by means of proper bolts and nuts, as seen clearly in Fig. 4. They will be formed with openings for the pipes *g*, which communicate with the interior pipe, *c*, and with openings for the pipes *k*, by means of which the hot-blast may be conducted to the furnace.

It will now be seen that by means of the connecting devices *h*, in combination with the pipes *g* and *k*, communication may be opened with the interior of pipes *c* for admission of cold air, and with the interior of cylinders *b*, thereby permitting the escape of hot air.

The external hot-air pipes, *k*, may be made in sections having proper flanges, so that they may be readily secured together or taken apart at a point near the connections *h*, as shown in the drawings.

The pipes *g'* will be made of rubber or other suitable flexible material, so that when it may be desired to remove one or more sets of the cylinders *b c* for repairs or renewal the connections *h* may be loosened from their fastenings to the cylinders *b*, and the discharge-pipes *h* disjointed, as before described, (which is but trifling labor.) The said connections *h* and the short adhering sections of the pipes *k*, together with the cold-air pipes *g*, may be sufficiently removed to permit the withdrawing of the said sets of cylinders from the oven without disturbing others than the individual connections of the cylinders so removed, or disarranging the joints of the pipes *g g'* and supply-pipe *f*. The openings in the oven, thus exposed by the removal of the said sets of cylinders, may then be closed by means of suitable caps; and the oven, with its remaining cylinders, may continue its operation without any interruption whatever, suitable valves, as *m*, being arranged in the pipe *p*, to close the openings leading into the pipes *k* when said pipes *k* are not in operation. The said sets of cylinders *b c* may be removed from the front

or rear of the oven, as may be found most convenient.

It will now be clearly seen that there are no joints or connections of any kind within the oven, and that any defect in the joints or pipes connected in any manner with the heating devices may be seen at once, and repaired without checking the operation of the hot-blast; that each particular set of cylinders *b c* is independent of all the others, and may be removed or replaced without disturbing in the least degree the continuous and successful operation of the others, and also that none of the joints or connections are exposed to the intense heat of the oven.

Suitable valves will be provided to regulate and control the admission of cold air.

The discharge or external hot-air pipes, *k*, may be so arranged as to be allowed vertical motion in their connections with the pipe *p*, in order to compensate for the expansion and contraction of metal.

The number of sets *b c* forming the series of heating-cylinders may be varied as circumstances require.

The operation of my improvement is so plain and simple that no particular explanation thereof will be found necessary by persons conversant with other devices for like purposes.

Although I consider fire-clay or its equivalent earthen material far superior to any other for those parts of my invention used within the oven, yet it is quite obvious that metallic cylinders constructed and arranged as herein shown and described, and being thereby made to operate in conjunction with the connections, joints, and pipes outside the oven, as set forth, constitute a decided improvement, and may be employed without departing from the spirit of my invention; but inasmuch as I believe the employment of suitable clay as a material for the construction of the air vessels or passages within hot-blast ovens to be new and to be a very important and useful improvement, without reference to the particular form or arrangement of such vessels or passages, I wish to claim the use of clay or its equivalent earthen substance as employed for the construction of devices for containing air to be heated within hot-blast ovens without regard to the configuration or arrangement of such devices.

Having thus described my improvement sufficiently to enable persons skilled in the art to which it appertains to construct and use the same, what I claim as new, of my own invention, and desire to secure by Letters Patent, is—

1. The employment or use of fire-clay or other equivalent earthen material in the construction of the heating pipes, chambers, or vessels used as air-passages within hot-blast ovens, substantially as hereinafter described, for the purposes set forth.

2. The employment of the annular rings or stops *e*, in combination with the cylinders *b c*, substantially as and for the purposes specified

3. In combination with the pipes *g* and *k*, and also with the cylinders *b c*, the connections *h*, constructed and arranged to operate substantially as represented.

4. The arrangement of the connections *h*, pipes *g* and *k*, and their necessary points, with reference to the heating-cylinders, when the same are arranged outside the oven, and constructed in such manner as to be removable

from the said cylinders, as and for the purposes set forth.

In testimony of which invention I have hereunto set my hand and seal this 17th day of November, 1863.

R. E. BROWN. [L. s.]

In presence of—

H. E. CLIFTON,

A. P. JONES.