

(No Model.)

J. R. McBRROME.
Furnace for Ventilating Mines.

No. 239,816.

Patented April 5, 1881.

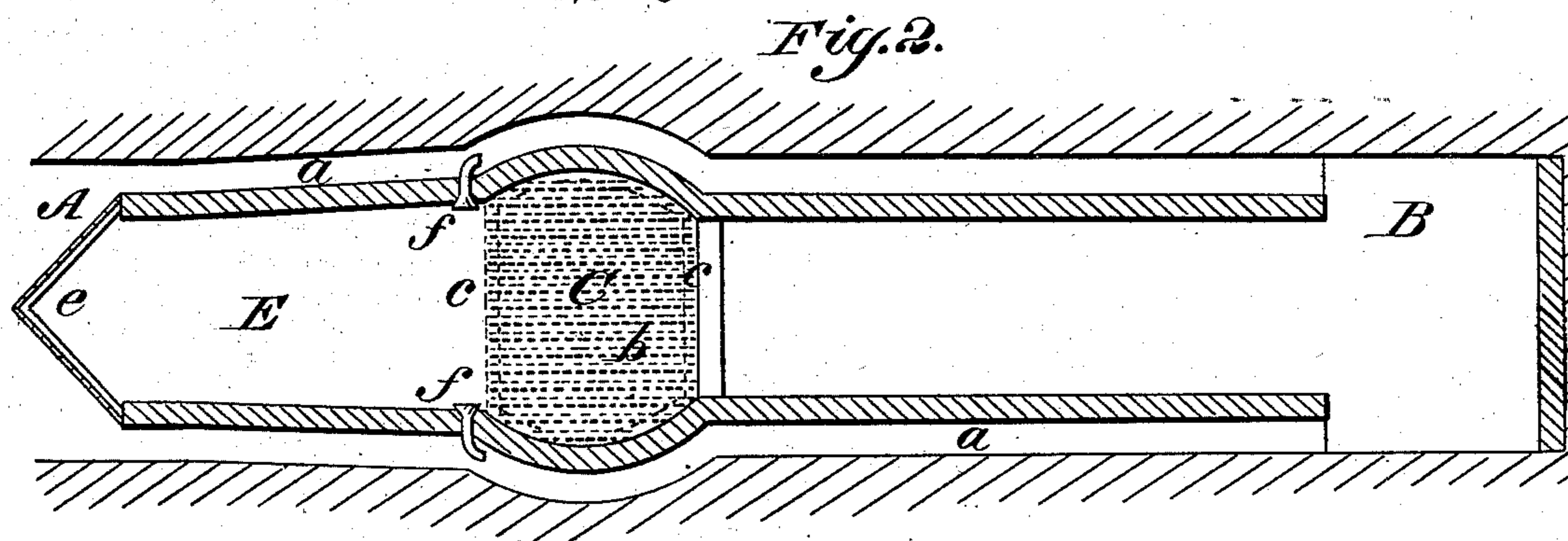
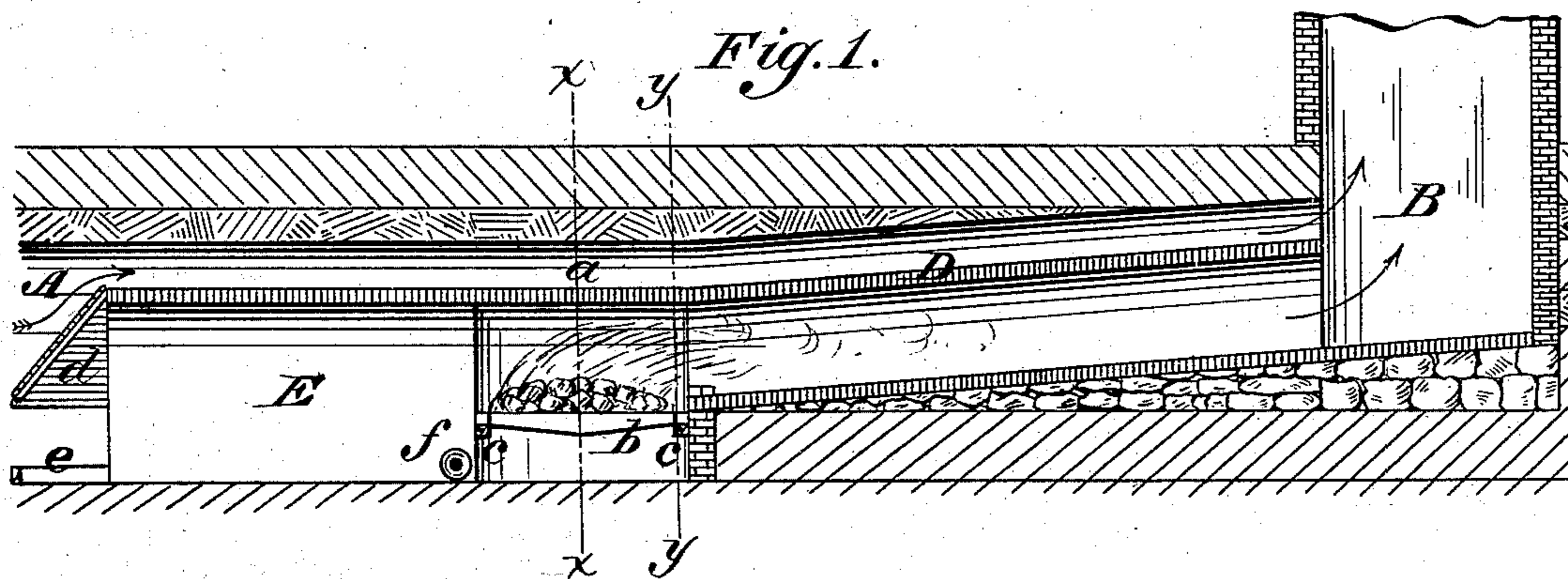


Fig. 3.

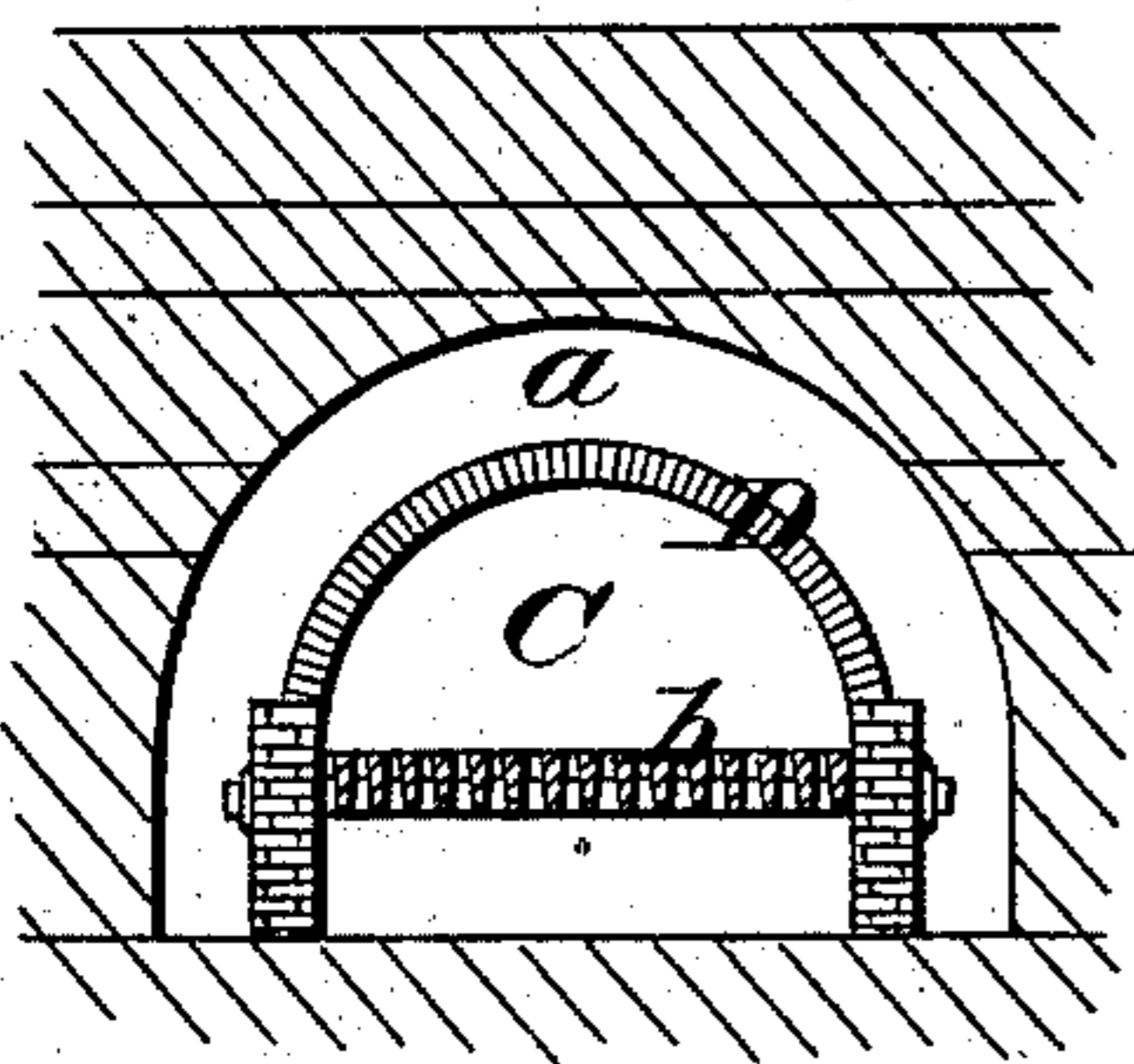


Fig. 4.

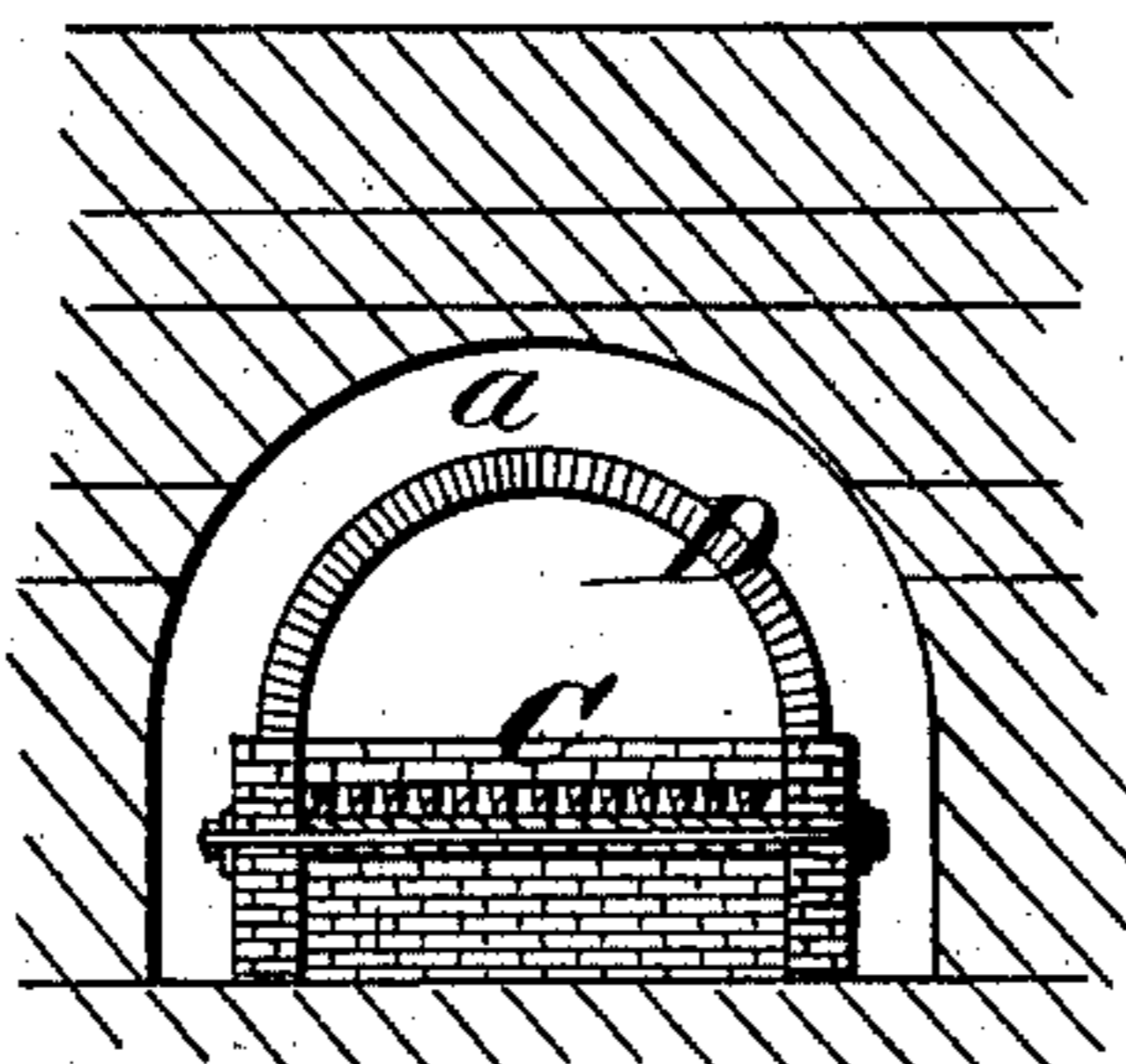
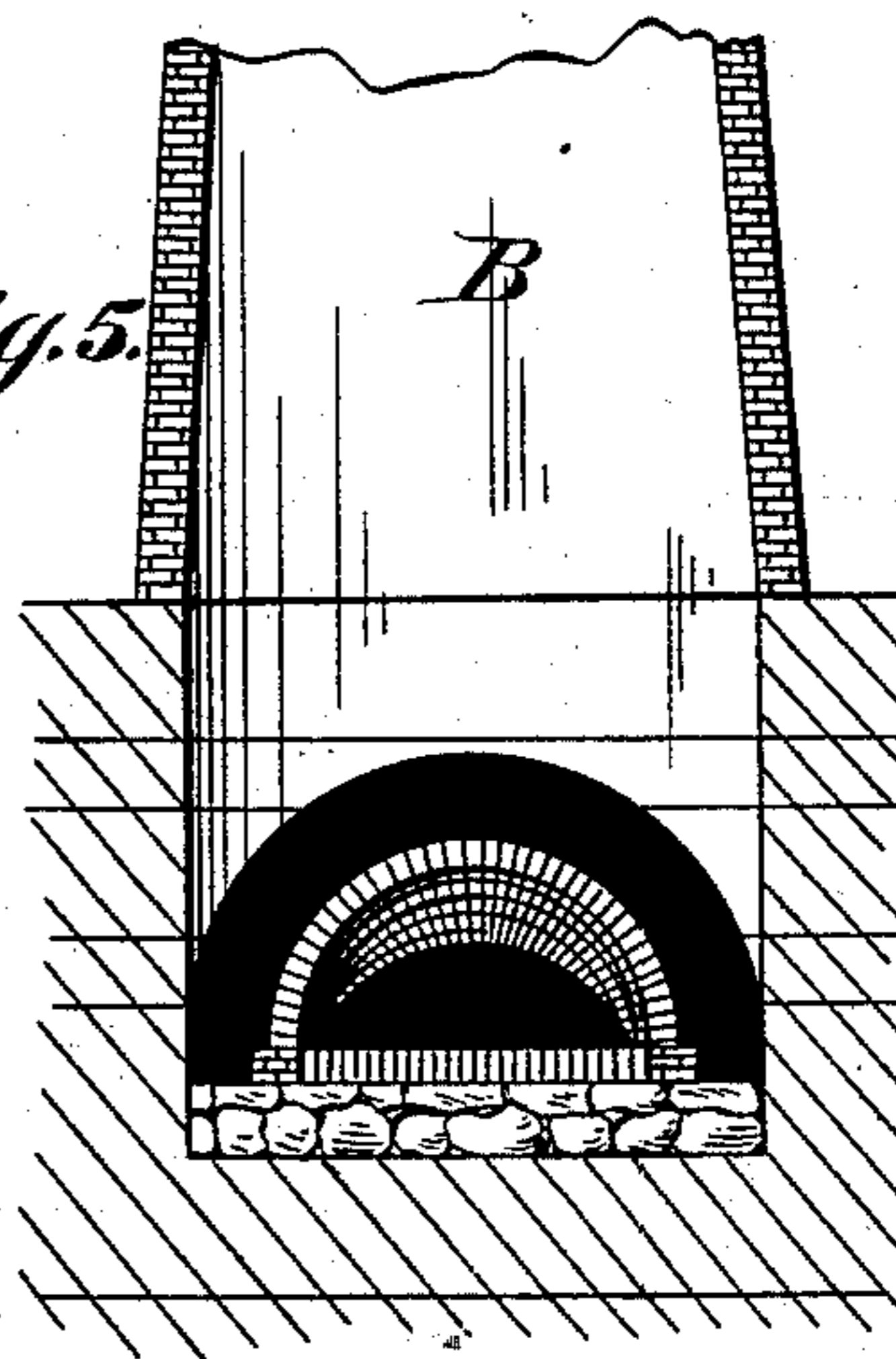


Fig. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN R. MCBROOME, OF WOODVILLE, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO AUGUSTUS E. BAUM, GUARDIAN FOR IRA R. BAUM, OF SAME PLACE.

FURNACE FOR VENTILATING MINES.

SPECIFICATION forming part of Letters Patent No. 239,816, dated April 5, 1881.

Application filed September 7, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. MCBROOME, of Woodville, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnaces for Ventilating Mines, of which the following is a specification.

In the construction of this improved furnace, the principal objects I have in view are to increase the power of the furnace, insure security of life and property in mines, to adapt and arrange the artificial draft to the specific gravity and properties of the gases, and to remove obstructions to their discharge in natural order of stratification, and to utilize the gases in the performance of ventilation. At the same time the object is to prevent the heavy and the explosive gases from coming in contact with the fire, and to prevent ignition of the coal-vein and timbering of the shaft by the furnace-fire.

My invention consists in a furnace of novel construction, placed in an arched passage within the mine, so that the furnace-arch is surrounded at top and sides by an air-space. The furnace-arch and air-space enter a vertical ventilating-shaft at one point.

Further it consists in deflectors for directing the light and heavy gases to the air-space and tubes for escape of carbonic-acid gas from the furnace-arch, and also in certain other features which render the operation more effective.

The construction and operation will be described more particularly with reference to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a vertical longitudinal section of my improved furnace. Fig. 2 is a horizontal section of the same. Fig. 3 is a vertical cross-section on line *xx* of Fig. 1. Fig. 4 is a similar view on line *yy* of Fig. 1, and Fig. 5 is a vertical cross-section of the ventilating-shaft.

Similar letters of reference indicate corresponding parts.

A represents an arched horizontal passage to the mine, connected with the vertical shaft B. The passage A is to be of suitable size, and should be straight and unobstructed for some distance back from shaft B, in order that the gases may assume their natural position by gravity and flow freely. In the arched

passage A is placed the furnace C, connected by arched flue D with shaft B, which arch extends also in front of the furnace, forming a flue, E. The interior or furnace arch, D, should be, say, forty feet in length, and about two-thirds the width of the main passage A, so that there is a space, *a*, at the top and sides of the furnace-arch. The arch D can be made of light material, such as brick or tiling, except in the portion immediately above the fire, so as to radiate heat to the passage *a*, and thus aid the ventilation, as it is only necessary to separate the explosive gases from the flame. At the back of the furnace the bottom of arched flue D is raised and slopes upward to shaft B. The passage A will also slope upward from the front of the furnace to the shaft B, so that the air-space *a* and flue D discharge at the same level.

The furnace proper is made with its sides rounded outward, and with the exit somewhat more narrow than the entrance, as shown in Fig. 2, in order to retain and intensify the heat.

The grate-bars *b* of the furnace rest on cross-bearers *c*, that are held by tie-rods passing through the side walls, so as to lock the same.

At the inner end of arch D is a hood or deflector, *d*, extending at an inclination downward from the crown of the arch a suitable distance, according to the quantity of explosive gas generated in the mine. This hood serves to prevent the lighter gases from entering beneath arch D, and deflects them upward and sidewise to the air-space *a*. There is also upon the floor of passage A, and at the inner end of arch D, a low wall, inclining inward and backward from the sides of the arch to a point, and forming a V-shaped deflector, that acts to arrest the low-lying heavy gas, such as carbonic-acid gas, and turn the same to the passage *a*.

The air and gases for sustaining combustion in the furnace enter the passage E between the hood *d* and deflector *e*.

To remove any accumulation of carbonic-acid gas from the space in front of the ash-pit, I provide tubes *f*, which extend through the walls of arch D to space *a*. The tubes are formed with flaring mouths, and curve into the air-space *a* in the direction of the current, so that the gas is sucked outward from the

space in front of the furnace. Any accumulation of heavy gas which might otherwise enter and dampen the fire is thus carried off.

Sliding doors may be provided at the front
5 of the fire-space and ash-pit, and such doors used for regulating the fire.

When the shaft B is timbered at the bottom the end of arch D will terminate a short distance back from the shaft, to prevent injury to
10 the timber.

By the above-described construction the furnace first creates a draft through the interior arch and up the shaft B, and, secondly, creates a draft through space *a* to the shaft.
15 Both the heavier gas, which would extinguish the fire, and the lighter gases, such as carburated hydrogen, which would explode by ignition, are carried off by the air-passage *a*, and the furnace is supplied by the strata contain-
20 ing the largest amount of oxygen.

It will be seen that the gases may pass off in their natural order of stratification, and a certain quantity of oxygen is deflected for promoting the velocity of the current, in addition
25 to its use to promote combustion in the furnace, so that the oxygen acts in the two capacities—namely, as a feeder of the fire and promoter of current at the junction of the two currents.

30 The arrangement and construction may be

modified to suit the conditions existing in the mine, the power required, and character of gases produced.

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

1. In ventilating-furnaces for mines, the interior arch, D, having furnace C placed at about its mid-length, combined with the arched passage A and shaft B, substantially as shown
40 and described, for operation as set forth.

2. In ventilating-furnaces for mines, the furnace C, placed within arch D, that connects with the ventilating-shaft, provided at its front with passage E, and having air-space *a*, extending to the ventilating-shaft, around the top and sides of the furnace, substantially as
45 shown and described.

3. In ventilating-furnaces for mines, the hood *d*, combined with furnace-arch D and
50 arched passage A, substantially as and for the purposes set forth.

4. The V-shaped deflector *e*, combined with furnace-arch D and outer arched passage, A, to the ventilating-shaft, substantially as and
55 for the purposes set forth.

JOHN ROBERTSON McBROOME.

Witnesses:

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