(No Model.)

Z. SARGENT, M. CHASE & A. W. CRAM.

GRATE.

No. 391,082. Patented Oct. 16, 1888.

Fig. 1.

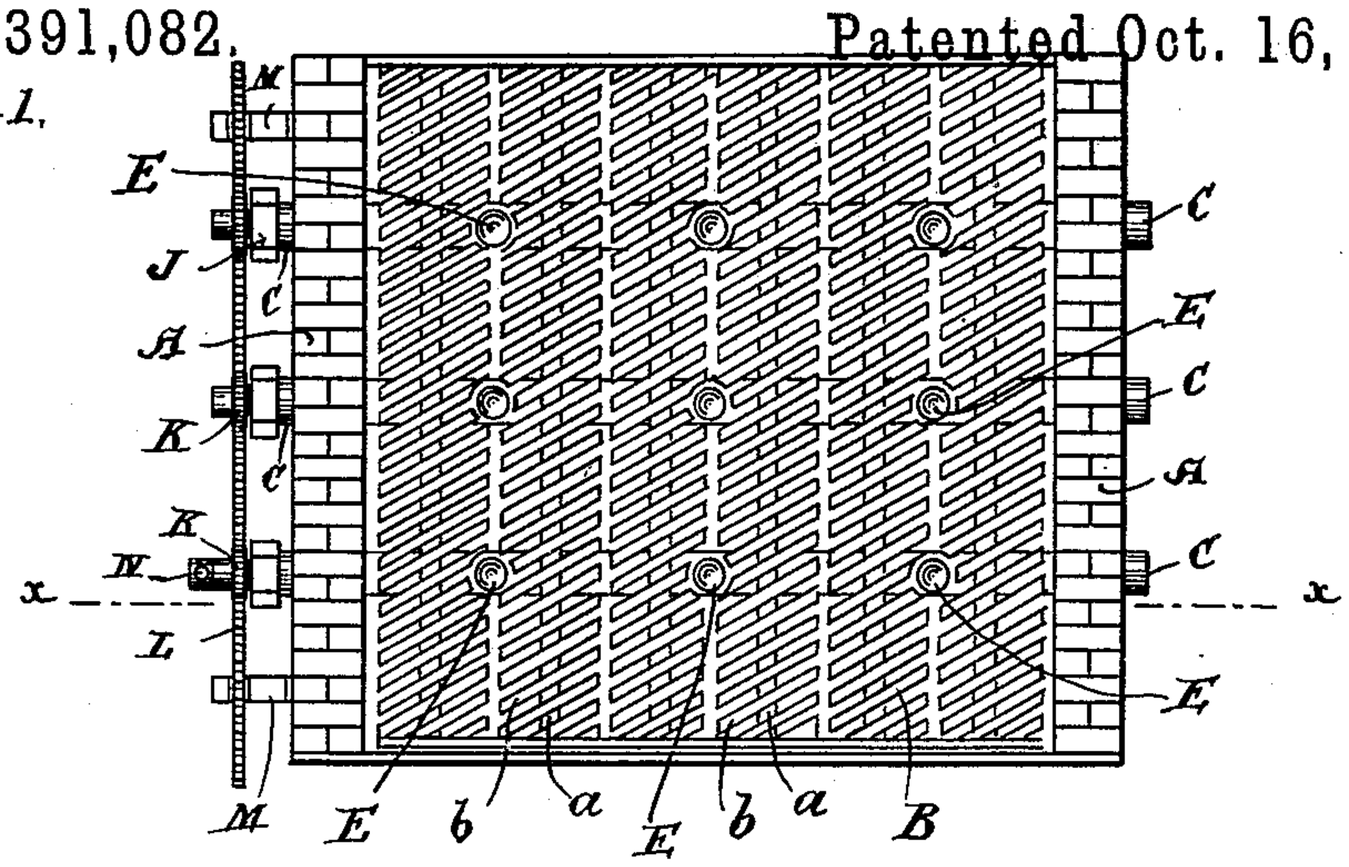


Fig. 3.

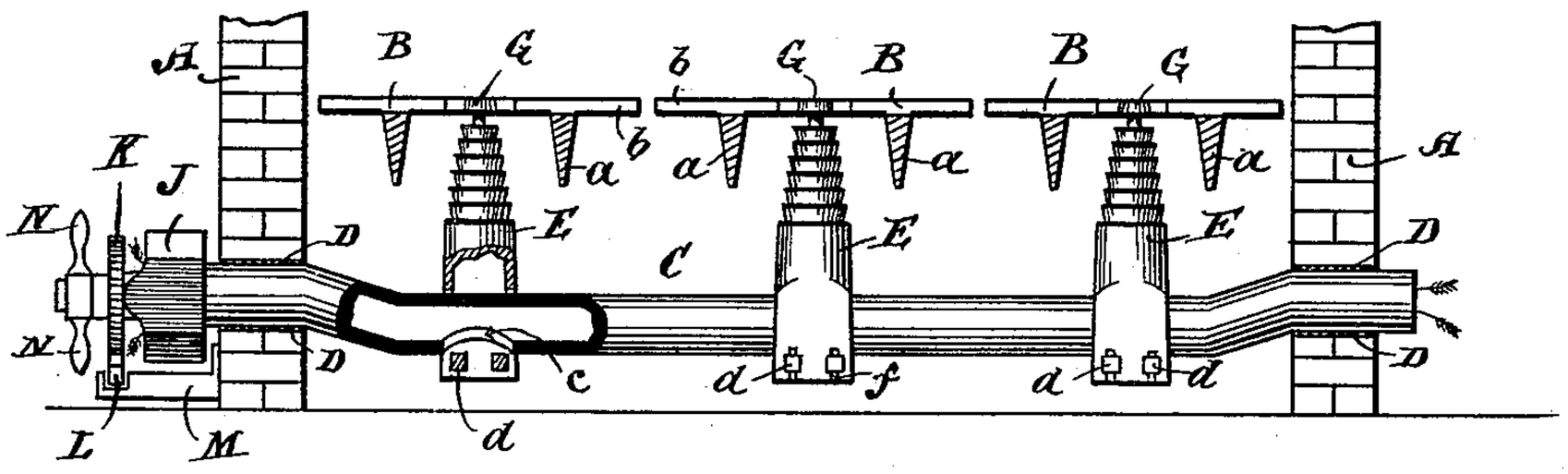


Fig. 2.

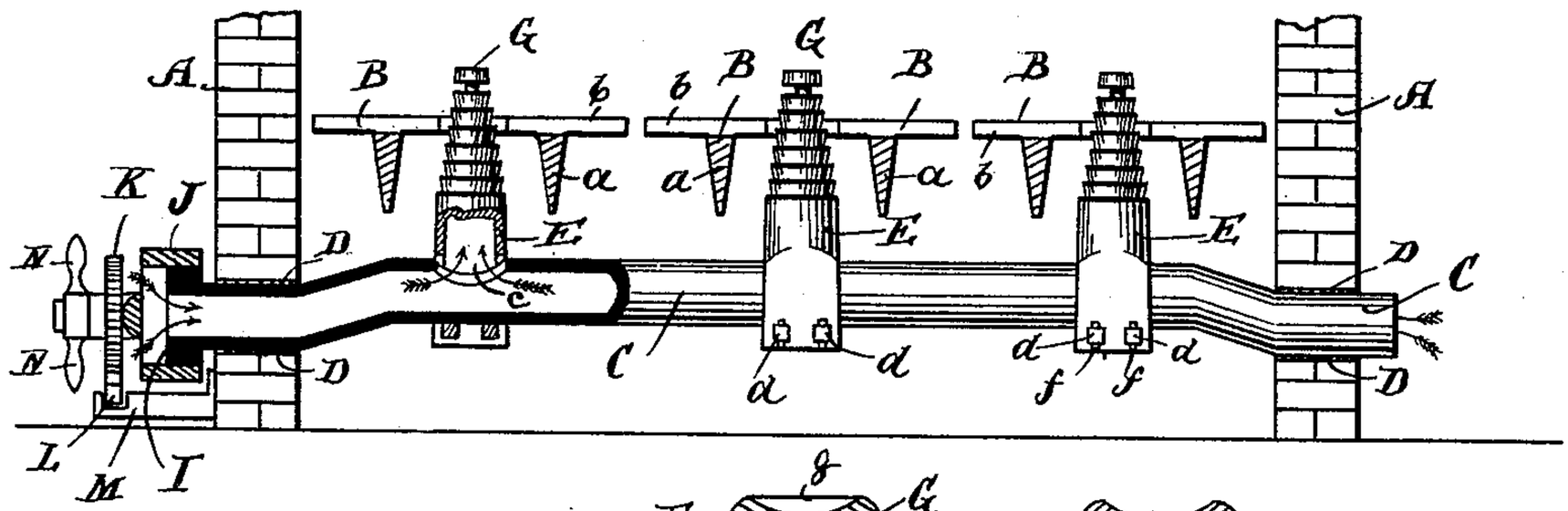


Fig. 5.

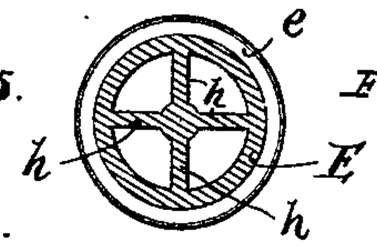


Fig. 4.

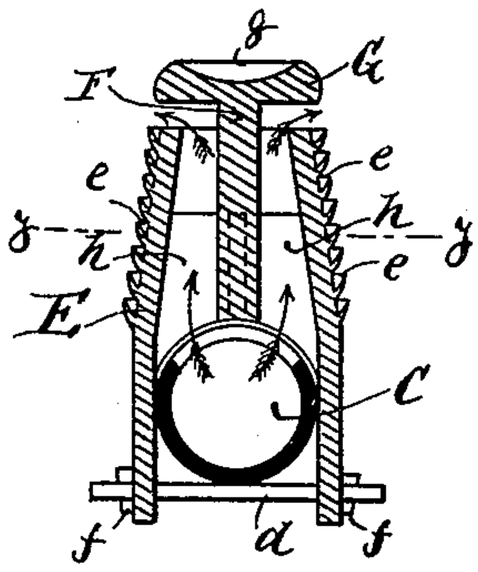
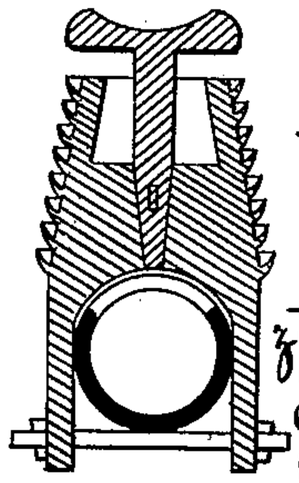


Fig. 6.



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UNITED STATES PATENT OFFICE.

ZEBADIAH SARGENT, OF ROCHESTER, NEW HAMPSHIRE, AND MILTON CHASE AND ALONZO W. CRAM, OF HAVERHILL, MASSACHUSETTS, ASSIGNORS TO THEMSELVES, AND SAMUEL P. BANCROFT, OF SWAMPSCOTT, MASSACHUSETTS.

GRATE.

SPECIFICATION forming part of Letters Patent No. 391,082, dated October 16, 1888.

Application filed February 8, 1888. Serial No. 263,383. (No model.)

To all whom it may concern:

Be it known that we, ZEBADIAH SARGENT, a citizen of the United States, residing at Rochester, in the county of Strafford, New Hampshire, and MILTON CHASE and ALONZO W. CRAM, both citizens of the United States, residing at Haverhill, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Furnace-Grates, of which the following is a specification.

The object of our invention is to produce a furnace-grate whereby air can be supplied to the top of the fuel as required when the ash-pit door is closed, thereby producing almost perfect combustion and a great saving in fuel.

The invention consists in mounting air-tubes or tuyeres upon crank-shaped pipes that extend from side to side of the furnace, so that the air-tubes or tuyeres can be raised to conduct the air passing through said pipes and tubes to the top of the fuel, or lowered so that the air supplied will be cut off.

The invention also consists in the peculiar construction of the air-tubes or tuyeres, as hereinafter fully set forth, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a plan or top view of a furnace-grate embodying our invention. Fig. 2 is a transverse vertical section taken on line *x x* of Fig. 1, drawn to an enlarged scale, showing the air-tubes or tuyeres raised. Fig 3 is a similar section showing the air-tubes or tuyeres lowered. Fig. 4 is a vertical section through one of the air-tubes or tuyeres. Fig. 5 is a cross-section of same, taken on line *y y* of Fig. 4. Fig. 6 shows a tuyere with a removable center.

A A represent the side walls of a furnace, and B B the grate-bars. These bars we prefer to make of the form shown—viz., a central web, *a*, provided with cross-bars *b* on the top, said cross-bars being set on an angle and arranged as shown, and cut away where the air-tubes or tuyeres come, so as to leave sufficient room for them to work up and down freely.

C C are pipes, bent or formed at each end, as shown, so as to form a double crank. The ends of these pipes extend through the side wall and work in bushings or bearings D, consisting of a short piece of pipe let into the side walls, A.

E E are air-tubes or tuyeres, formed at their lower ends to fit over the pipes C, to which they are secured by a bolt or bars, *d*, and keys *f*. The upper ends of the tuyeres are made conical and provided on their outer side with a series of recesses or shelves, *e*, and on their inner side they are provided with arms *h*, that support or carry a central stem, F, provided at its upper end with a disk or head, G, that stands a short distance above the sides E. The head G we prefer to make with a depression, *g*. The object of the recesses or shelves *e* around the tuyere and the depression *g* in the head G is that ashes may lodge therein, and thereby prevent the tuyere from being readily burned.

The pipes C are provided with a hole, *c*, wherever a tuyere is to be placed, so as to allow the passage of air from the pipe to the tuyere when the latter is in the raised position; but when the pipe is turned so as to lower the tuyeres the communication will be cut off and there will not be any air admitted, and any dirt or cinders that may have fallen into the pipe C will be readily thrown out through the opening *c*.

In the drawings we have shown one end of the pipes provided with a nut or boss, I, upon which is fitted a key, J, formed hollow for the air to pass through, and to each of the keys J is secured a pinion, K, that is in gear with a rack, L, supported in suitable bearings, M, and one of the keys J is provided with handles N, so that by turning the handles N motion is communicated to all the pipes C through rack L and pinions K, so that they are all simultaneously operated to raise or lower the tuyeres E. If desired, each of the pipes C may be operated independently of the others by a lever or other convenient means.

In operation, when the tuyeres E are raised, air entering at each end of the pipe C passes into and up the tuyeres E to the surface of the

fuel, and in its passage is heated to such a degree that when it is delivered and commingles with the products of combustion the gases are at once ignited, thus producing nearly, if not quite, perfect combustion, thereby utilizing nearly, if not all, the heating properties of the fuel. When it is desired to let the fuel smoulder, as when works are shut down for the night, before the fire is banked up the tuyeres are lowered, as shown in Fig. 3, so that no air is admitted through them.

Any desired number of tuyeres may be employed in a grate, according to its size and to the amount of heat required, for the greater the number the quicker the combustion.

We have shown the tuyeres in Fig. 1 as being arranged between each alternate set of grate-bars; but they may be placed between each of the bars, if required.

The tuyeres may be made with a removable stem, F, and head G, as shown in Fig. 6, so that should the head G be burned out before the tuyere E it can be removed and replaced by a new one.

What we claim as our invention is—

1. In a furnace-grate, tuyeres mounted upon a cranked air-pipe, whereby they can be raised to supply air to the upper surface of the fuel or lowered to cut off the supply, substantially as shown and described.

2. The tuyeres E, provided with a central stem, F, and head G, in combination with a cranked air-pipe, C, provided with openings *c*, substantially as and for the purposes set forth.

3. In a furnace-grate, a series of cranked air-pipes, C, provided with tuyeres E, in combination with mechanism for operating them simultaneously, substantially as and for the purposes set forth.

4. The tuyere E, provided with a series of recesses or shelves, *e*, and a central stem, F, provided with a head, G, having a recess, *g*, substantially as and for the purposes set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ZEBADIAH SARGENT.
MILTON CHASE.
ALONZO W. CRAM.

Witnesses:
L. W. HOWES,
E. PLANTA.