

(No Model.)

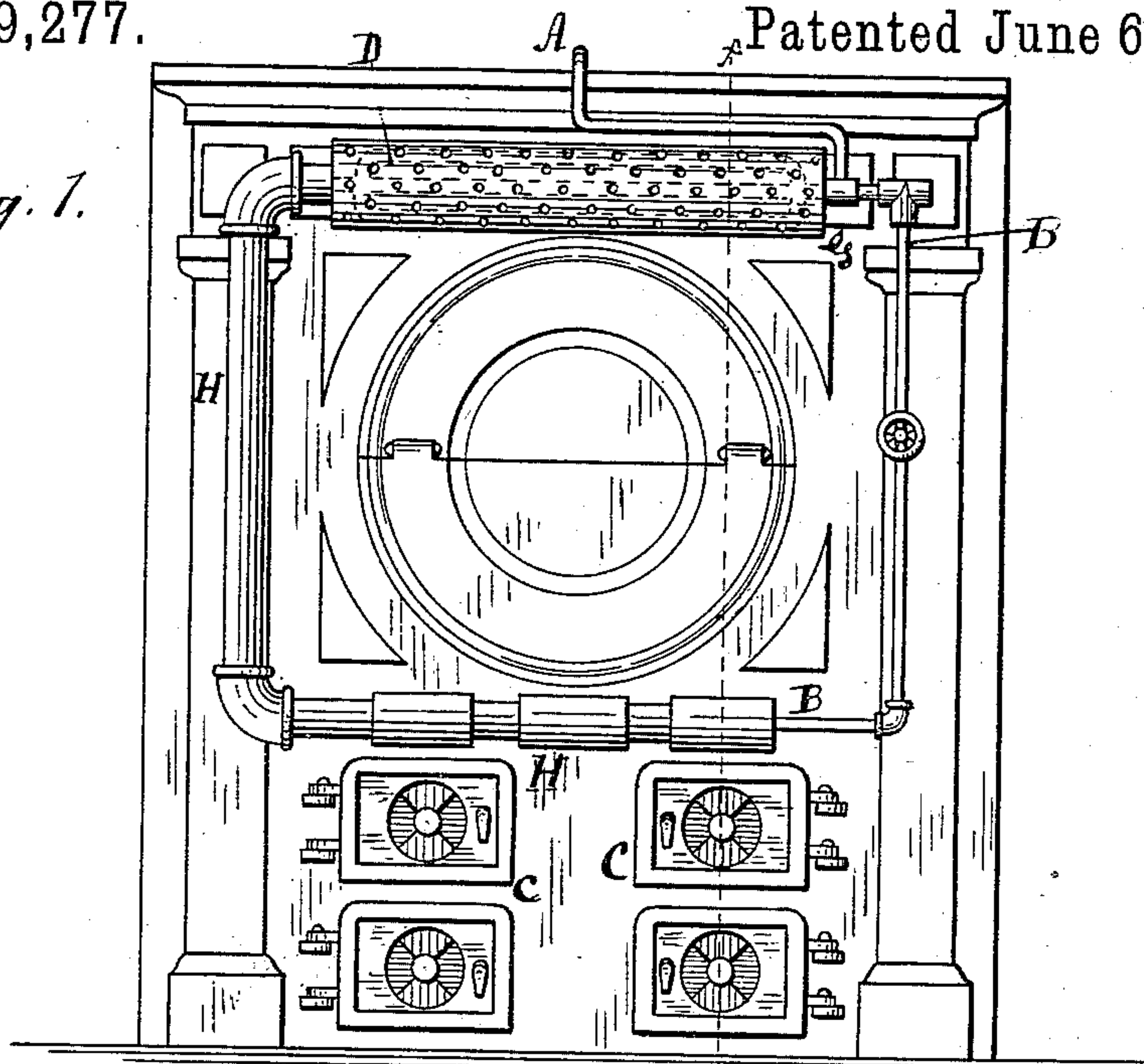
2 Sheets—Sheet 1.

T. MURLEY.  
SMOKE BURNER.

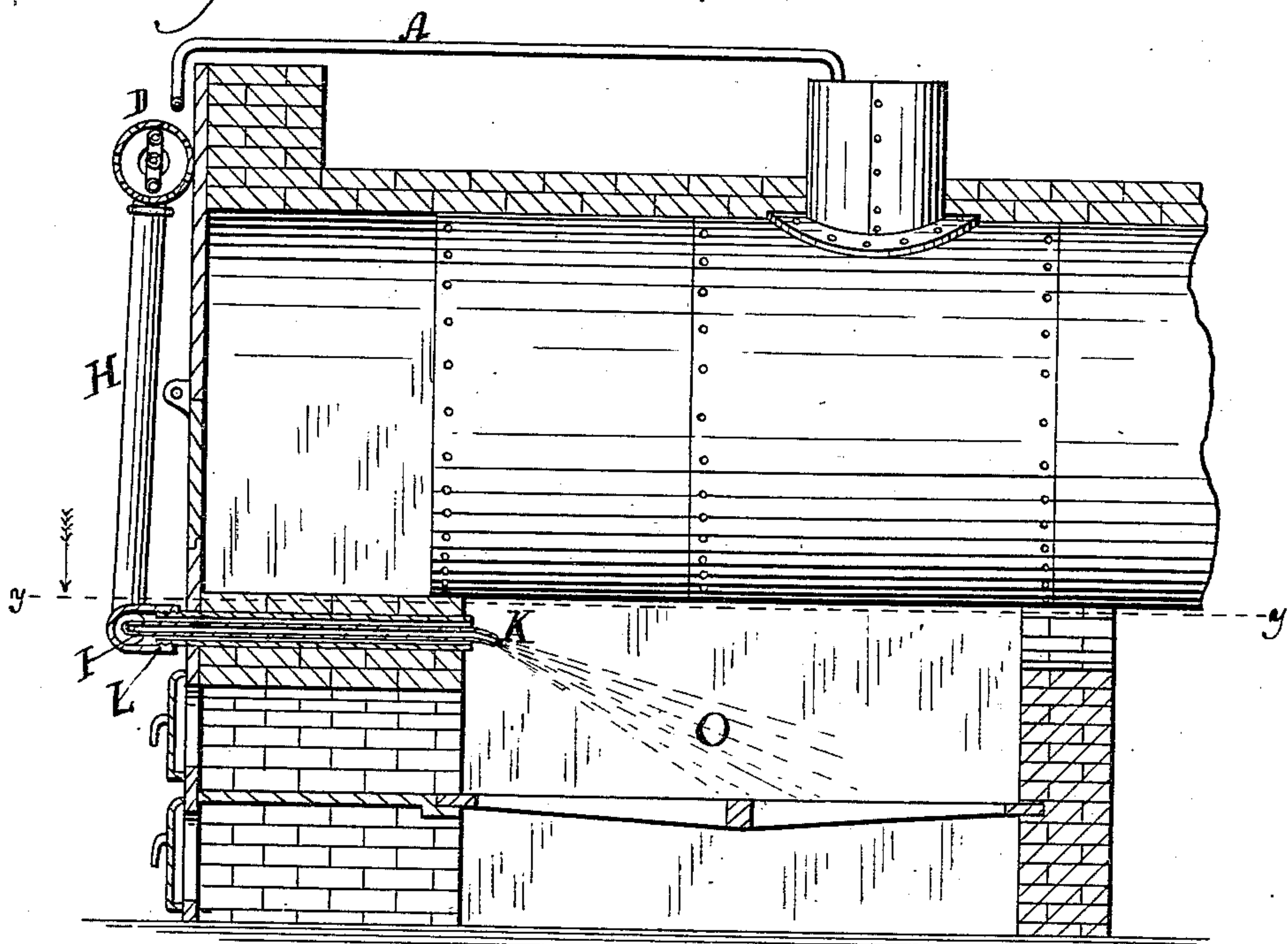
No. 259,277.

Patented June 6, 1882.

*Fig. 1.*



*Fig. 2.*



Witnesses  
*Henry Frankfurter,*  
*Leffulbut*

Inventor.  
*Thomas Murley*  
per. *Jas. A. Cowles*  
Attorney.

(No Model.)

2 Sheets—Sheet 2.

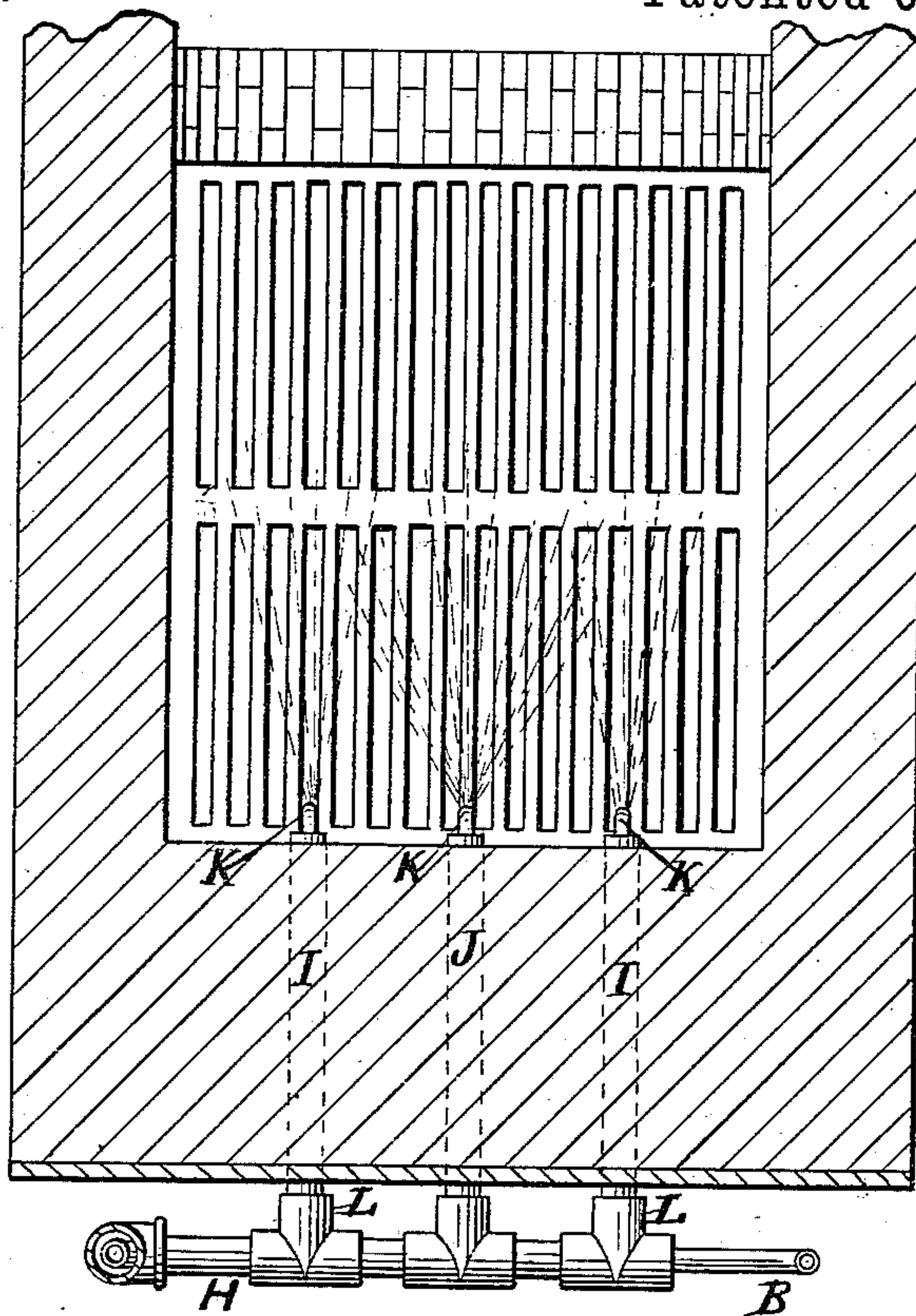
T. MURLEY.

SMOKE BURNER.

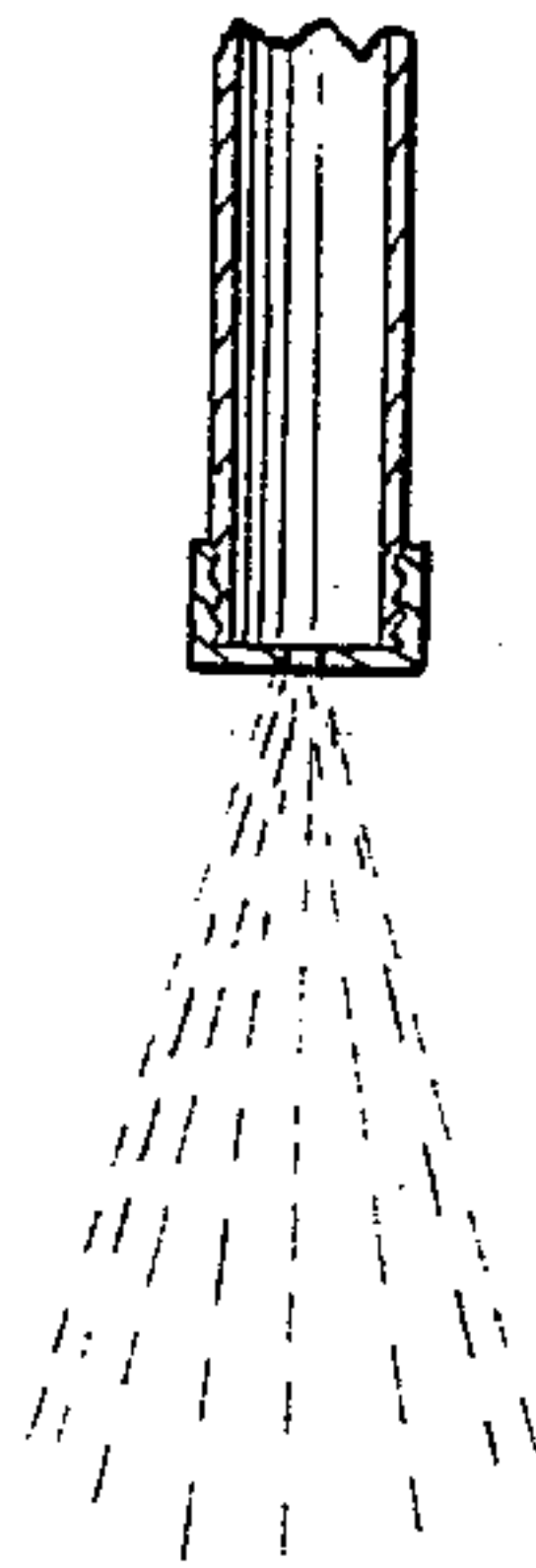
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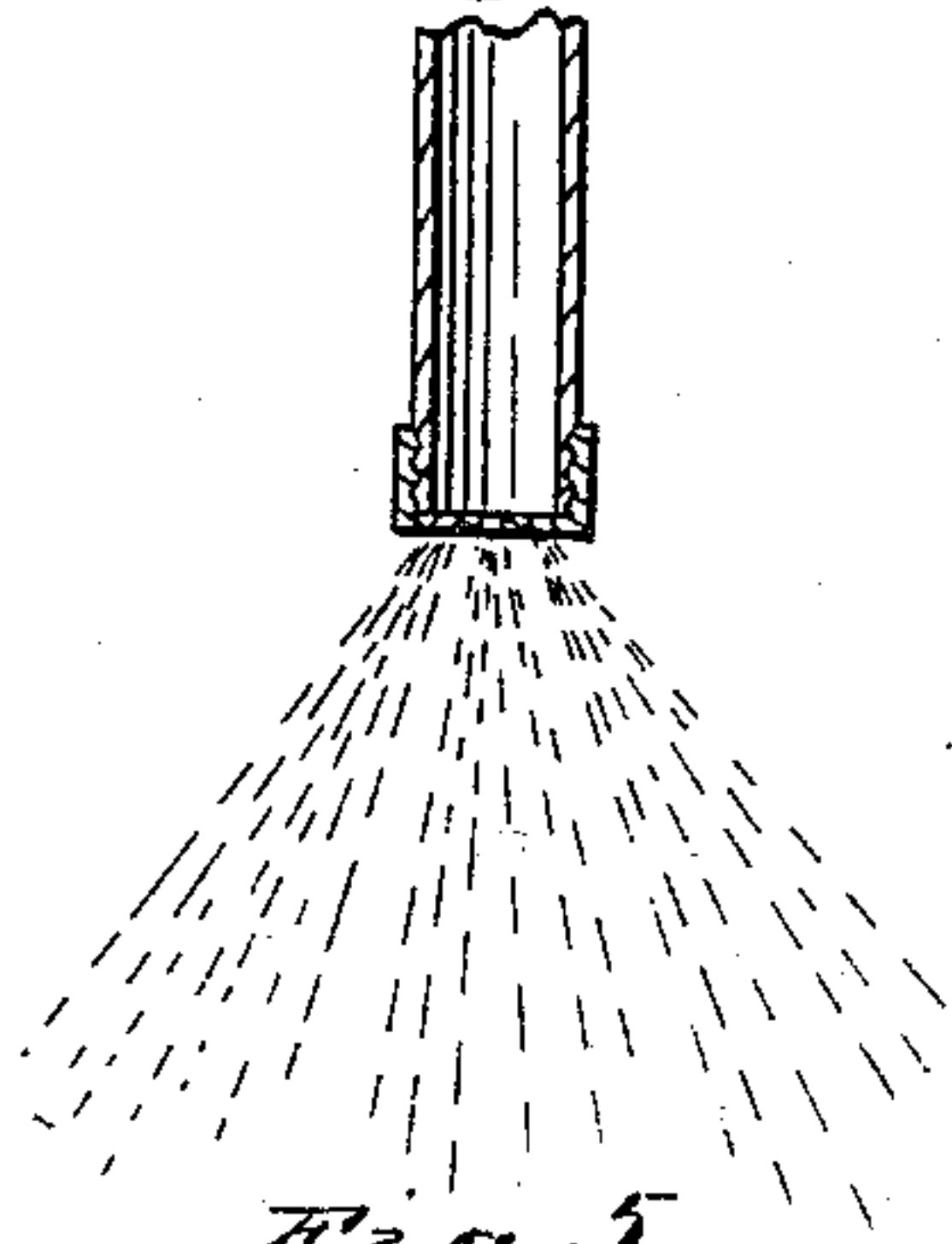
*Fig. 3.*



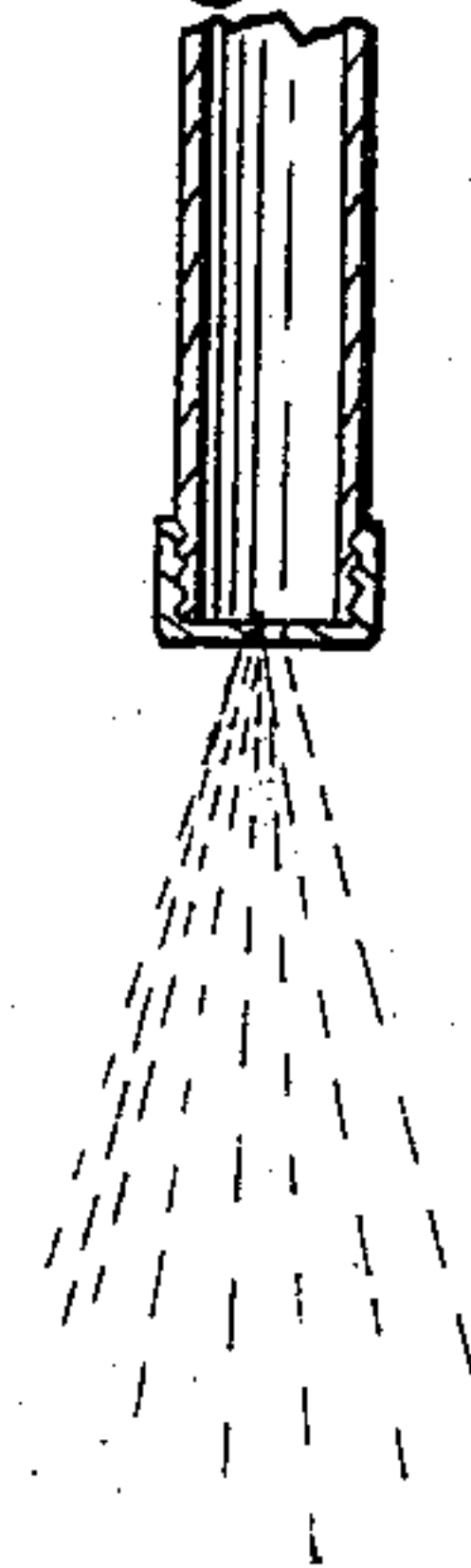
*Fig. 4.*



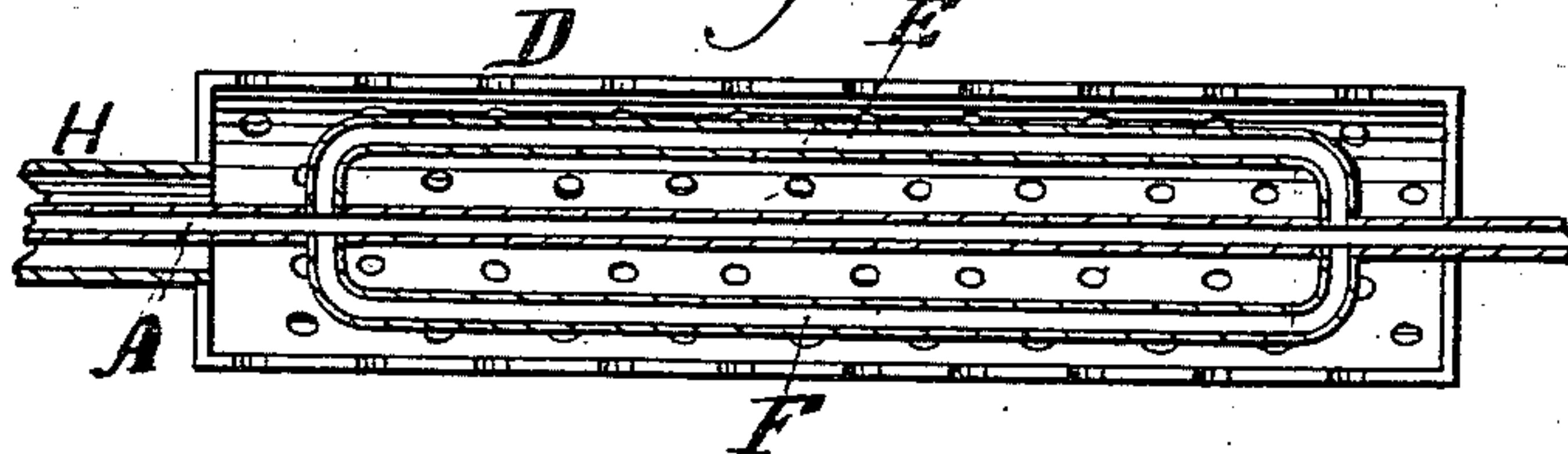
*Fig. 6*



*Fig. 7*



*Fig. 5.*



Witnesses,  
Henry Frankfurter,  
J. Schuchert

Inventor,  
Thomas Murley  
per. Jas A Cowles  
Attorney,



# UNITED STATES PATENT OFFICE.

THOMAS MURLEY, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
SENECA D. KIMBARK, OF SAME PLACE.

## SMOKE-BURNER.

SPECIFICATION forming part of Letters Patent No. 259,277, dated June 6, 1882.

Application filed January 21, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS MURLEY, a citizen of the United States, residing at the city of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Smoke-Burners, of which the following is the specification.

Figure 1 is a front view of a boiler placed in position with my smoke-burner attached. Fig. 2 is a longitudinal sectional view through *x x* of Fig. 1, showing steam-jet pipes running into fire-chamber. Fig. 3 is a horizontal view of fire-chamber and grates from line *y y* in Fig. 2. Figs. 4, 6, and 7 are views of discharge end of steam-jet pipes in the fire-chamber, as will be explained hereinafter. Fig. 5 is a vertical sectional view of air-drum and steam-pipe therein.

The object of this invention is to provide an apparatus that when applied to steam-boilers will aid in the combustion of fuel to the extent of making the combustion as nearly perfect as possible.

Similar letters of reference refer to similar parts in the different drawings.

A is a steam-pipe leading from the boiler or the dome of the boiler and connects with the steam-pipe B. This steam-pipe B passes in front of the boiler, down each side, and across the bottom just above the doors C C, which lead into the fire-chamber, thus forming a continuous pipe around the front of the boiler.

D is a perforated air-drum located around the top part of pipe B, as shown in Fig. 1 and at Fig. 5. Within this air-drum are additional steam-pipes, connected at both ends with steam-pipe B for the purpose of presenting more heating-surface to the heating of air. At end G of air-drum it is air-tight around pipe B. At the opposite end this air-drum is connected with a jacket-pipe, H, surrounding pipe B. This jacket-pipe H is larger in diameter than pipe B, leaving an air-space between the two.

From the lower horizontal stretch of the steam-pipe B there extend three steam-jet pipes, I J I, as shown in Figs. 2 and 3, through the front wall and into the upper front part of the fire-chamber, each having their inner end slightly turned downward, as shown at K, Fig. 2. All of these pipes enter the fire-chamber parallel to each other. Around each of these

steam-jet pipes is also a jacket-pipe, L, extending through the front wall and nearly to the end of the steam-jet pipes. These jacket-pipes L are connected to the jacket-pipes H.

At end K of each of the two steam-jet pipes, I I, is a single hole of about one-sixteenth of an inch in diameter. At same end of the middle steam-jet pipe, J, are three holes of the same diameter, arranged in a horizontal line across the end of the pipe. The two outer holes run divergently from the line of the pipe, while the middle one runs directly with the line of the pipe, as shown in Fig. 6, and at J, Fig. 3.

The jacket-pipe H extends from the air-drum D around to and a little distance short of the steam jets I J I.

Live steam from the boiler is admitted into pipe A, which passes into pipe B, in which it circulates both ways, thus making an even pressure on all three, or each of the steam-jets I J I, through which it passes into the fire-chamber.

Air enters the air-drum D through the various openings or perforations therein, where it is heated by the steam-pipes in the drum and jacket-pipe as it passes down through the jacket-pipes H and L into the fire-chamber. The steam escaping from end K of the steam-jet pipes draws the air through the jacket-pipes H and L, and at K it is thoroughly mingled with the steam, and the two thus mingled are thrown forward with the tendency to strike the grate-bars at about their center between the bridge-wall and the front wall of the fire-chamber.

Fuel is fed into the fire-chamber through the doors C C and under the steam and air-jets O, Fig. 2, and as it is partially consumed and assumes the character of burning coke it is pushed back, in a measure, to make room for another supply of fuel.

The condition of the fuel in the fire-chamber is as follows: The fresh fuel is under the steam and air jets, and the lively-burning coke is beyond them, toward the bridge-wall. As fresh fuel is fed to the fire, the first interval thereafter is when the unconsumed carbon escapes and produces black smoke. Were there sufficient oxygen present at this interval the now escaping carbon would be burned, and thus



smoke prevented. As the steam and air jets are thrown obliquely across the path of the escaping unconsumed carbon the deficiency in oxygen is supplied to it, when complete combustion instantly follows in its passage over the burning coke beyond the air and steam jets. By the diverging course of the lateral jets in central steam-jet, J, steam comes in contact with jets from side pipes, I I, and thus a canopy is formed over the fire beneath it. Hence the intermingling of the steam, air, and escaping carbon is perfect and the flame is short, chopped, and shattered, and in color is white, showing the combustion so nearly perfect as to destroy all black smoke.

The downward course of the steam and air jets O obviate all danger of burning the boiler. In the drawings only three steam and air jets are shown. Ordinarily this number would do; but should more be required, as in a large boiler, the number could be increased without departing from my invention. In the lateral steam-jet pipes I I but one hole is mentioned and shown. Should it be desired, more could be

employed without departing from my invention. Care should be exercised, and not have too much capacity for the escape of steam into the fire-chamber, as it would impede the working of the burner.

I am aware that air has been introduced into the fire-chamber in connection with steam for the purpose of facilitating combustion, but the means and arrangement herein used are believed to be new.

I claim—

In combination with a steam-boiler and its fire-chamber, the steam-pipes A and B, jacket-pipes H and L, and perforated drum D, all located outside of boiler, and steam-pipes I J I, the side pipes, I I, having one or more direct holes in each end K, and the central pipe, J, having one or more direct central holes and two diverging holes in end K, substantially as shown, and for the purpose described.

THOMAS MURLEY.

Witnesses:

JAS. A. COWLES,  
H. R. PEBBLES.