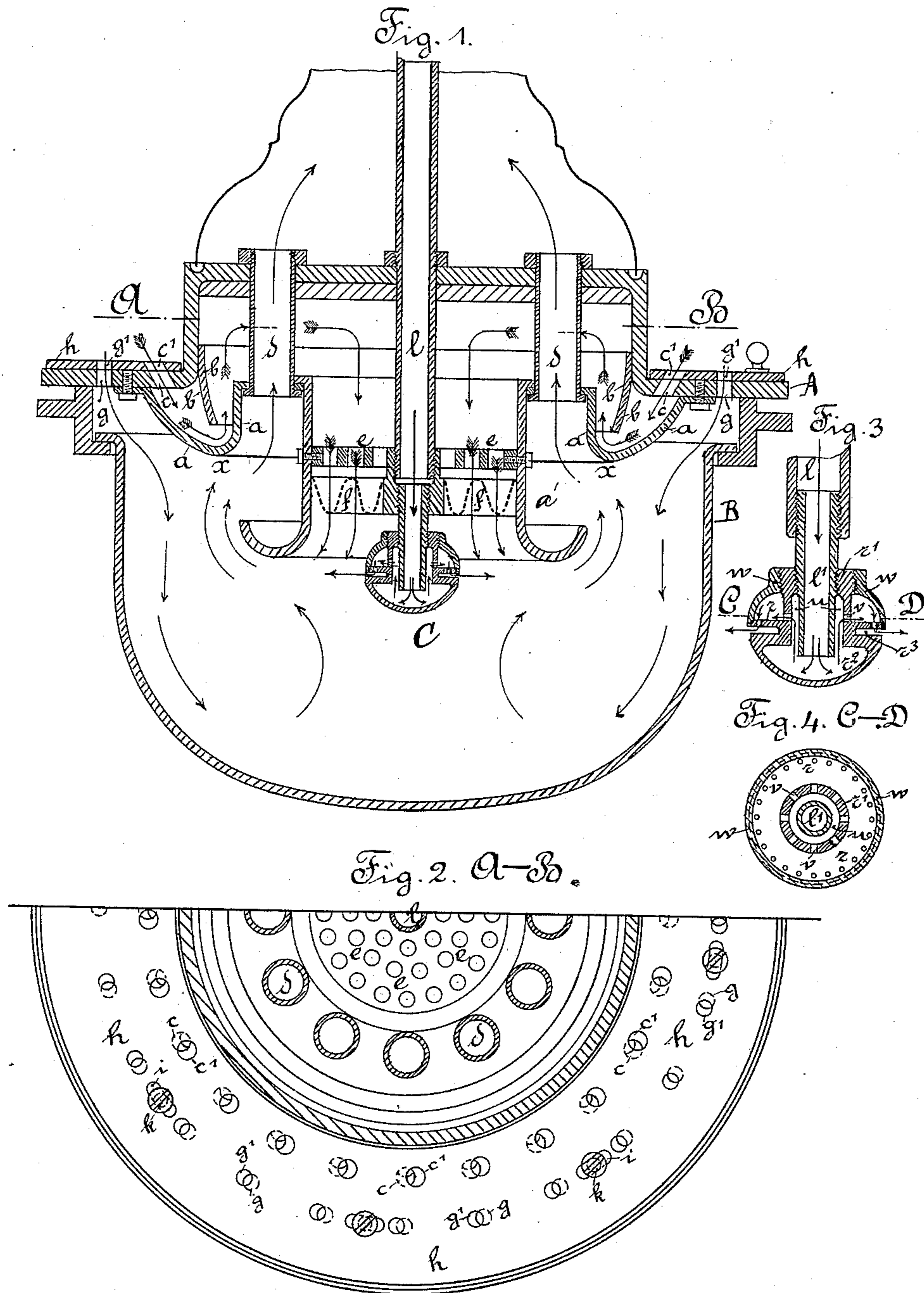


(No Model.)

W. STERN.  
REGENERATIVE GAS BURNER.

No. 391,866.

Patented Oct. 30, 1888.



Witnesses:  
*B. A. C.*  
*A. Kühn.*

Inventor:  
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# UNITED STATES PATENT OFFICE.

WILHELM STERN, OF BERLIN, GERMANY.

## REGENERATIVE GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 391,866, dated October 30, 1888.

Application filed March 1, 1888. Serial No. 265,825. (No model.)

*To all whom it may concern:*

Be it known that I, WILHELM STERN, a subject of the King of Prussia, German Emperor, residing at Berlin, in the German Empire, have invented certain new and useful Improvements in Regenerative Gas-Lamps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a rational preparatory heating of the air for combustion and of the gas in regenerative lamps. The hottest place of the whole lamp is directly over the jet-flame near  $xx$ , and this place has in this my improvement been utilized by a suitable construction for a preparatory heating of the air, while the gas is likewise considerably heated by a novel burner easily to be cleaned. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the lamp. Fig. 2 is a horizontal section of the lamp on the line A B, Fig. 1. Figs. 3 and 4 represent the new burner.

Similar letters refer to similar parts throughout the several views.

The external casing of the burner consists of an upper part, A, and a lower part, B. A part of the former is horizontal and provided with inlets  $c$  for the primary air-supply, and  $g$  for the secondary air-supply, the former being nearer the center of the burner than the latter. A partly trough-shaped ring,  $a$ , is attached to said upper part, A, of said casing, on the under side thereof, between the holes  $c$  and the holes  $g$ . Another ring,  $b$ , shaped like the side of a bowl, is also attached to the upper part, A, of the casing and extends down into the hollow of the trough-shaped part of ring  $a$ , so that these two rings form a bent passage for the inflowing air from inlet  $c$ , the point  $x$ , where the passage bends, being one of extreme heat. This is owing to the fact that the ring  $a$  is provided with an inward and downward extension,  $a'$ , the lower part of which curves upward and forms a guide for the products of combustion and heated air as these come from the burner C, suspended centrally of the casing a little below this extension  $a'$ .

The curved end of this extension directs the products of combustion against the trough-shaped part of ring  $a$  at the point  $x$ . Thence they pass upward through exit-tubes  $d$ , which are attached to said ring. On its way from the bent passage stated the air from primary inlet  $c'$  plays round the exit-tubes  $d$ , heated by the outgoing gases of combustion, and passes downward through a perforated bottom,  $e$ , and perforated plate  $f$  to the flame. The perforated plate, which is likewise strongly heated, is intended to be provided with a great many and narrow holes, in the passing of which the air is heated to a still greater degree.

The secondary air for combustion flows in through the apertures  $g$ , and a correct relation between primary and secondary air being absolutely necessary for obtaining a quiet white flame, the entering of same is governed by an annular slide,  $h$ . The latter is placed over the holes  $c$  and  $g$  and possesses corresponding holes,  $c'$  and  $g'$ , which are arranged in such a manner that in opening the holes  $c$  the holes  $g$  are closed, and vice versa. The slide is guided by means of slot-holes  $i$  and screws  $k$ , or other suitable devices. Of course such slide can be devised also separately for the holes  $c$  and  $g$ .

The gas flows through the inlet-tube  $l$  to the burner and mixes in its exit with the primary air preparatorily heated.

In order that the gas may be raised to a temperature as high as possible, it is compelled to make a way as long as possible within the glowing burner.

The burner C consists of a disk,  $r$ , perforated like an Argand burner, to which disk is joined the short tube  $r'$  and the hollow space  $r^2$  closed roundabout. Between the disk  $r$  and the hollow space  $r^2$  there is an annular slit,  $r^3$ . The inlet-tube  $l'$  catches through the tube  $r'$  in the hollow space  $r^2$ , and between the tubes  $r'$  and  $l'$  the annular open space  $u$  is left. The disk  $r$  is toward the top closed by the shade  $w$ .

The inlet-tube  $l'$  easily unscrews from the small tube  $r'$ , and this latter unscrews from the upper part of the body of the burner. These pieces  $l'$  and  $r'$  and said body are then easily cleaned by hand with the aid of any soft absorbent substance and water or other proper cleansing liquid.

The gas flows (as indicated by arrows) from

the inlet-tube  $l'$  to the hollow space  $r^2$  through the annular open space  $u$  and the small holes  $v$  to the space formed by the shade  $w$  and escapes through the small holes of the disk  $r$ ,  
5 from where it is compelled by the slit  $r^3$  to move laterally toward the flame.

What I claim, and desire to secure by Letters Patent, is—

1. In combination with a burner, an exterior casing having primary air-inlets  $c$  and two rings,  $a, b$ , respectively inside and outside of said inlets and together forming a bent passage for the primary air-supply, a perforated bottom allowing this air to reach the burner, and an  
15 extension or guide,  $a'$ , which directs the products of combustion against the bottom of ring  $a$  at the bend of the passage, for the purpose set forth.

2. A casing having primary air-inlet  $c$  and  
20 secondary air-inlet  $g$ , in combination with a regulating-plate,  $h$ , having registering holes  $c'$  and  $g'$ , a ring,  $a$ , partly trough-shaped, attached to the casing between inlets  $c$  and inlets

$g$ , another ring,  $b$ , extending into the hollow of ring  $a$  to make a bent passage for the pri- 25  
mary supply of air, a burner, an extension or guide directing the products of combustion against the ring  $a$ , and a means of communication allowing the primary supply to descend on the burner after being thus heated, while 30  
the secondary supply of air comes from below.

3. In a regenerative gas-lamp, an exterior casing having a series of inlet-openings for the primary air-supply and another series of inlet-openings for the secondary air-supply, in 35  
combination with a plate having two series of openings corresponding to said inlet-openings and movable over the same to regulate both supplies simultaneously, a ring or partition separating the primary inlets from the second- 40  
ary inlets, and a burner arranged within said ring, substantially as set forth.

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Witnesses:

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