O. TIRRILL.
Gas-Burner.

No. 220,736. Patented Oct. 21, 1879.

Fig. 1.

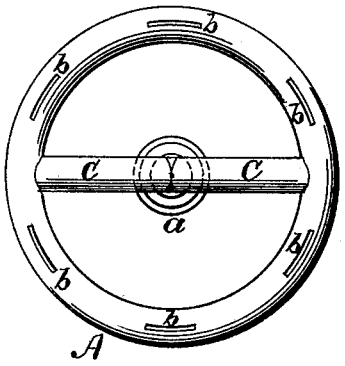


Fig. 2.

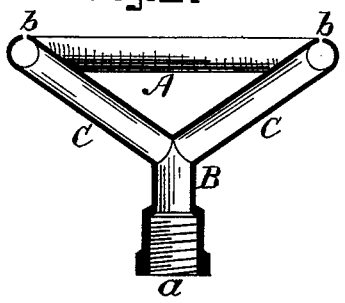


Fig. 3.

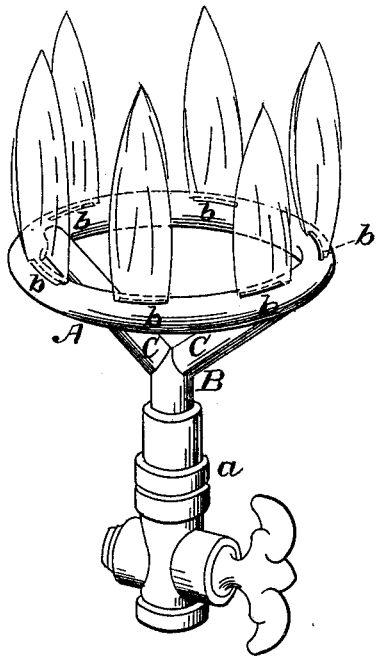
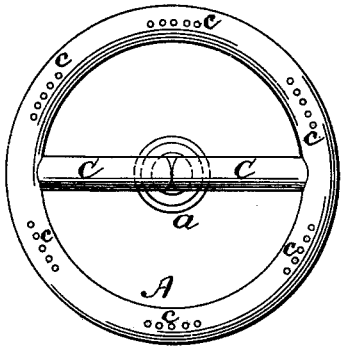


Fig. 4.



Witnesses.
Henry P. Parker.
Thos. Farrell

Inventor.
Oakes Tirrill.
per James A Whitney
Atty.

UNITED STATES PATENT OFFICE.

OAKES TIRRILL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN GAS-BURNERS.

Specification forming part of Letters Patent No. **220,736**, dated October 21, 1879; application filed July 19, 1879.

To all whom it may concern:

Be it known that I, OAKES TIRRILL, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Gas-Burners, of which the following is a specification.

This invention is more particularly calculated for burning that variety of illuminating-gas produced by impregnating atmospheric air with the vapor of liquid hydrocarbons, and which, with the burners hitherto in use, has given only an unsteady flame liable to the extremes of smoking and flickering.

The said invention consists in a novel construction of annular burner, whereby the internal and external drafts to the flame are so accurately balanced that the tension, so to speak, upon the flame is uniform and continuous at all parts thereof, from which there results an equable flame not liable to smoke or waver under any ordinary circumstances.

Figure 1 is a plan; Fig. 2, a vertical section; Fig. 3, a perspective view of the burner made according to my said invention; and Fig. 4 is a plan view, representing a slight modification thereof.

A is a hollow annulus or ring, connected with the gas-supply tube B by branch tubes C, which latter also serve to support the annulus A. The supply-tube may be attached in place for use by means of its internally-threaded socket *a*. Formed at equal distances apart in the top or upper side of the annulus are slots or long narrow openings *b*, the position and relative arrangement of which are more clearly shown in Fig. 1. These long and narrow openings *b* are not only equidistant, but are of uniform length. The length of the said openings *b* is such that the volume of gas issuing therefrom will not be sufficient to cause the edges of the several jets to impinge against each other, or sufficient to require more air to support combustion than can be supplied by the normal draft up through the annulus and around the circumference thereof.

It is difficult to lay down a specific rule of proportions, and the exercise of a fair degree of judgment is required to secure in the highest degree the advantageous results of the invention. The principle, however, on which its operation is based is this: The openings *b* are so proportioned to the volume of air supplied to the flame by the draft within and without the annulus, that the said supply will be sufficient to secure the full combustion for illumination of all the gas passed through the openings *b*, at the same time that the draft itself is so equalized with reference to the jet, separately and collectively, that its drawing action or tension is alike on all sides of each jet, and alike both within and outside of the annular series of jets considered as a whole, from which it follows that the tendency of the jets, will be uniformly upward without flickering or irregularity.

The invention may perhaps be further exemplified by saying that the flames of the burner do not constitute collectively a single flame, as would be the case if the openings *b* were so close together that the edges of the flames would impinge and connect one with another; neither do they constitute a mere series of independent flames, each uninfluenced by the character of its adjacent or neighboring flames; but it comprises in its operation a co-operating system of flames, each one of which in burning has an effect upon the draft, which affects the others; or, to change the form of expression, the invention consists in so combining burners for producing separate flames in the manner that causes each flame to modify the other, that the aggregate of action upon the separate flames is to produce the result of steadiness and freedom from flickering upon all. This may be further illustrated by comparison with the burners hereinafter disclaimed. That shown in the patent of Gale has an annular series of separate burners formed with slots or long openings, which are longitudinally radial to the axis of the device, this arrangement bringing the flames with their flat sides toward each other, a position inconsistent with the operation and results of my invention, inasmuch as each of the radial flames is unaffected by the presence of its neighbors, and would remain the same in volume and character if all the others were extinguished.

In the device shown in the patent of Cremin the jets issue horizontally from the outer cir-

cumference of the burner, each unaffected by its neighbors, and with the flames unaffected, separately or collectively, by any draft, the *modus operandi* being substantially that of several ordinary horizontal burners arranged around a common axis.

When desired the long narrow openings may be substituted each by a row of small perforations, *c*, as represented in Fig. 4, the *modus operandi* of this modification, however, being substantially the same as that of the apparatus, as herein first described.

I do not claim an annular series of independent radial burners, as shown in the patent of M. F. Gale, June 17, 1873. Neither do I claim a series of horizontal burners arranged on the outer circumference of an annular tube, as shown in the patent of J. N. Cremin, September 7, 1869, said devices, as hereinbefore explained, being different from my invention in structure, principle, and operation. Neither do I claim an annular burner constructed with a continuous series of perforations in its upper side and designed to provide a cylindrical or hollow or continuously circular flame, such being different in principle and construction from my said invention, and incapable of producing the peculiarly advantageous results achieved by my said invention; but,

What I do claim as my invention is—

The burner composed of the hollow annulus A, having in its top or uppermost side the long and narrow openings *b*, or the equivalent thereof, said openings being substantially concentric with the axis of the annulus, of equal size, and placed at equal distances apart, to insure an equal tension of vertical draft at the inner and outer sides of the flames, and between said flames, all substantially as and for the purpose herein set forth.

OAKES TIRRILL.

Witnesses:
JAMES A. WHITNEY,
HENRY F. PARKER.