No. 682,055. Patented Sept. 3, 1901.

E. FOUCHÉ.

GAS BURNER.

(Application filed Jan. 5, 1900.)

(No Model.)

Fig. 1.

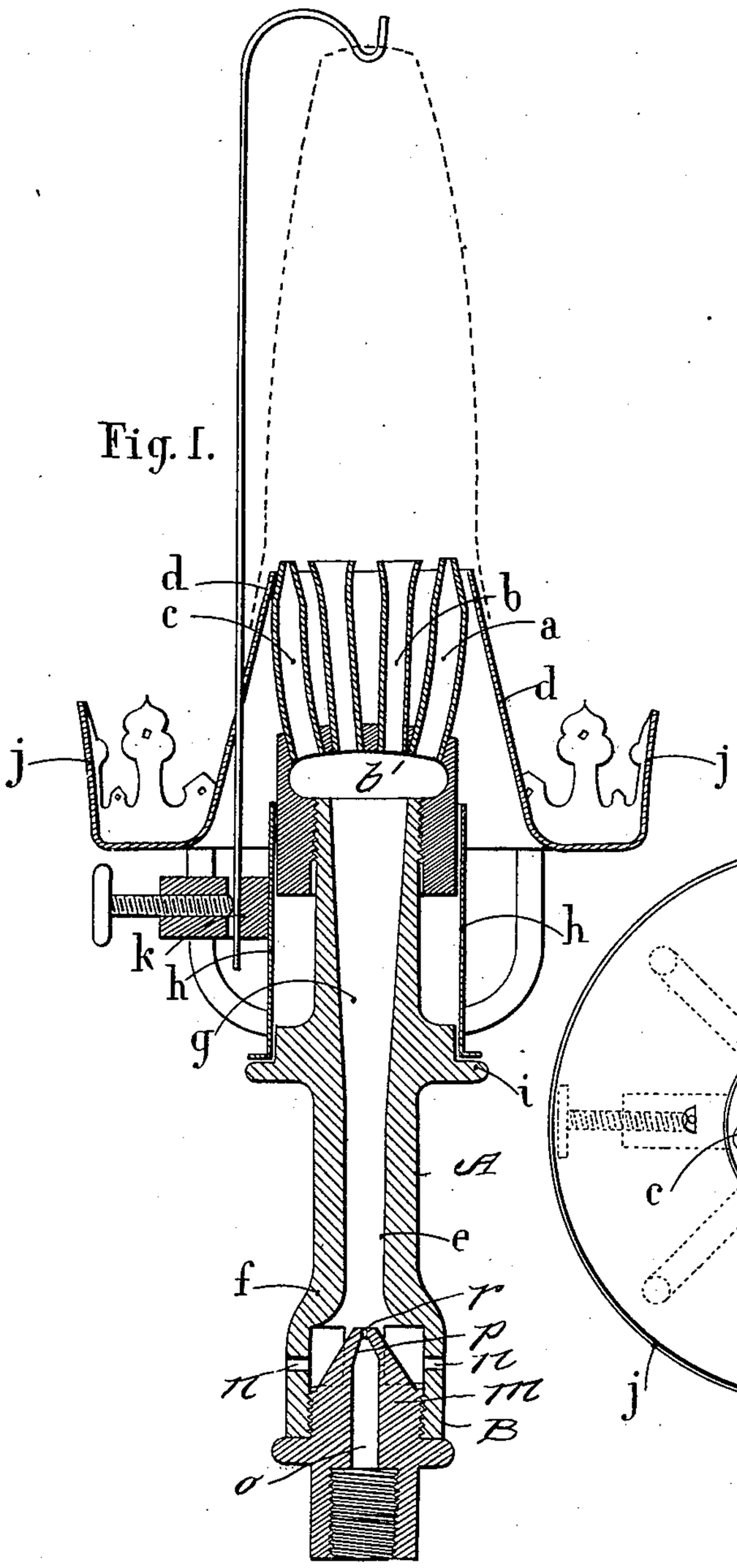
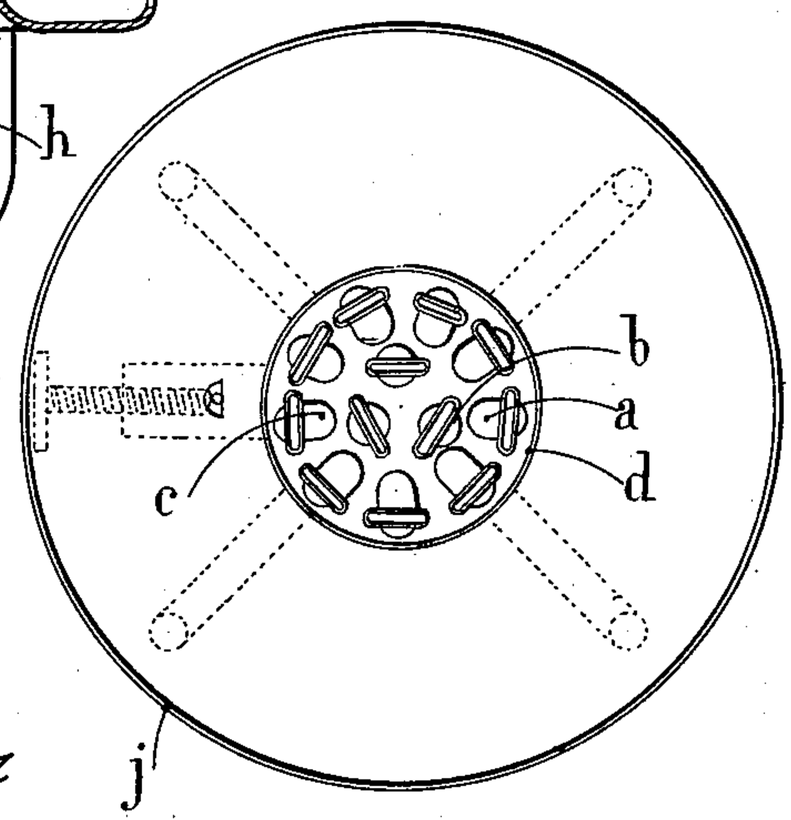


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

EDMOND FOUCHÉ, OF PARIS, FRANCE.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 682,055, dated September 3, 1901.

Application filed January 5, 1900. Serial No. 512. (No model.)

To all whom it may concern:

Be it known that I, EDMOND FOUCHÉ, a citizen of France, residing at Rue St. Lazare No. 28, Paris, France, have invented certain new and useful Improvements in Gas-Burners, of which the following is a specification.

The employment of acetylene gas for rendering mantles made of oxids of the rare earths incandescent is attended with considerable difficulty. Where the amount of air drawn in with the gas is sufficient to insure complete combustion, the mixture becomes so highly explosive that the flame cannot be maintained at the end of the tube, but fires back into the interior, produces a slight detonation, and ignites the jet of gas as it issues from the injector-nozzle. If, to obviate this defect, the quantity of air drawn in be reduced, an almost steady flame is obtained, but the light is far from being so efficient as that of a flame from gas sufficiently rich in air.

The object of this invention is to provide means by which the aforesaid difficulties are overcome. In a burner made according to this invention the mixture of acetylene gas and air escapes through orifices which are sufficiently narrow to prevent back-firing through them; but this alone is not sufficient, as if, through a sufficiently narrow orifice a completely combustible mixture of air and acetylene gas (say one of ninety-three per cent. of air and seven per cent. of acetylene) issues at a speed of four meters per second, corresponding to about one millimeter of pressure, the speed of combustion is upward of six meters, and the flame will tend to reënter the orifice at a speed of six meters minus four meters. The flame is checked by the cooling effect produced upon it by the walls of the orifice; but these walls gradually become so heated that back-firing takes place. This would be prevented from occurring if the speed with which the mixture of air and acetylene escapes were made to exceed the speed of combustion, (six meters in the example given.) It is, however, very difficult in the case of injectors arranged for the usual acetylene-gas pressure (from twelve to thirteen centimeters of water) to obtain an adequate amount of energy to insure the passage of the mixture through the narrow orifice of the burner at so high a speed. To overcome this difficulty, the mixture of air and acetylene gas is so proportioned as to contain less air than is theoretically necessary for complete combustion. In such a mixture the speed of combustion is under six meters, and it therefore becomes possible to cause this mixture to issue at a rate of speed practically equal to that of the speed of combustion. The heating of the material in which the orifices are formed is then kept sufficiently low, the heat imparted thereto being abstracted at an almost equal rate by the heat-conducting property of the said material; but as the gas mixture is not sufficiently rich in air it would not be capable of incandescing the mantle in a manner satisfactory on economical grounds.

The accompanying drawings represent in vertical section in Figure 1 and in plan in Fig. 2 a burner made in accordance with this invention.

The orifices are formed by tubes *a b c*, arranged at considerable intervals apart and surrounded by a convergent outer tube *d*, the wider end of which extends downward and admits external air, while its narrower upper end is within the lower part of the mantle. The air issuing through this narrower end is distributed around the tubes *a b c* and the flames therefrom and effects complete combustion of the gas. The aforesaid tubes in order to prevent their flames from firing backward into the interiors thereof should have very small diameters, and even then it would be impossible to overcome by the power of the injector alone the resistance which they would offer to the passage of the gas mixture. To reduce this resistance as much as possible, while at the same time increasing the efficiency of the injector, (hereinafter described,) instead of employing tubes which theoretically should be one millimeter in diameter at most tubes are employed which are of a diameter of several millimeters each, and which consequently offer far less resistance to the passage of the gas mixture. These tubes are flattened at their outlet ends or orifices, so that their sectional outline is approximately rectangular and so narrow as to prevent back-firing. The manner in which they are flattened is clearly illustrated in the drawings. The effect of this arrangement is

not to flatten the gas-jet to lamina shape until it reaches the point of its outlet and reduces the resistance to a minimum, and a very effective result is obtained. The tubes *a b c* are connected at their lower end to the cap *a'* and communicate with the gas-chamber *b'*. The inner face of the cap *a'* is formed of two different diameters, the smaller provided with screw-threads for securing the cap to the upper end of the injector-tube A, to be hereinafter described. The injector-tube A must be so constructed that sufficient power is given to drive the gas mixture through the tubes and flattened orifices and which cannot be obtained by the adaptation of the injector-tubes of ordinary construction. According to this invention the injector-tube A is formed substantially cylindrical in contour and provided with a feed-passage consisting of a narrow or contracted cylindrical part *e*, flaring outwardly at its lower end, as at *f*. The upper part of the feed-passage tapers outwardly, as at *g*, substantially in the form of an inverted cone. This part of the feed-passage communicates with the gas-chamber *b'*. The lower portion of the injector-tube A is or may be formed integral with a cylindrical collar or sleeve B, interiorly screw-threaded and provided with air-inlets *n*. Secured within the collar or sleeve B is the injector-nozzle *m*, which is exteriorly screw-threaded for engagement with the threads of the sleeve or collar B. The injector-nozzle *m* is provided with a cylindrical port or passage *o*, having the upper part thereof formed in a substantially conical manner, as at *p*, which communicates with the jet-opening *r*, the latter communicating with the flared lower end *f* of the feed-passage through the injector-tube. The injector-nozzle *m* is adapted to be connected to a suitable source of gas-supply. Gas coming with a high speed from the jet-opening *r* of the injector-nozzle *m* and air entering through the inlets *n* enter the feed-passage of the injector-tube through the flaring end of the latter. In the contracted part *e* of the feed-passage the speed of the mixture increases, so that it enters with a great speed in the inverted conical part *g* of the feed-passage. The mixture fills this part *g* and the chamber *w'* and compresses itself therein, so that the pressure becoms sufficient to cause the mixture to escape through the tubes and orifices with the proper speed to prevent back-firing. The parts may be connected in any convenient manner. For example, the tube *d* may be connected by arms to a tube *h*, supported by a shoulder or head *i* on the injector, and the said tube *d* may be provided with a gallery *j* to support a chimney or globe. Secured to the tube *h* at *k* may be a pinching screw device to carry the rod for supporting the mantle.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

In an acetylene-gas burner, an injector-tube provided with a feed-passage having a part of its length converging inwardly and terminating in a flared lower end and the remaining part of its length formed substantially conical in contour, a sleeve formed integral with the lower end of said injector-tube and provided with air-inlets, an injector-nozzle secured within said sleeve and formed with a passage terminating at its upper end in a jet-opening communicating with the flared lower end of said feed-passage, a cap secured to said tube and formed with a gas-chamber communicating with the upper end of said feed-passage, and a series of burner-tubes connected to said cap and communicating with said gas-chamber.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDMOND FOUCHÉ.

Witnesses:
EDWARD P. MACLEAN,
HIPPOLYTE JOTTEL.