

(No Model.)

2 Sheets—Sheet 1.

A. J. STEVENS.

APPARATUS FOR BURNING PETROLEUM.

No. 348,700.

Patented Sept. 7, 1886.

Fig. 1.

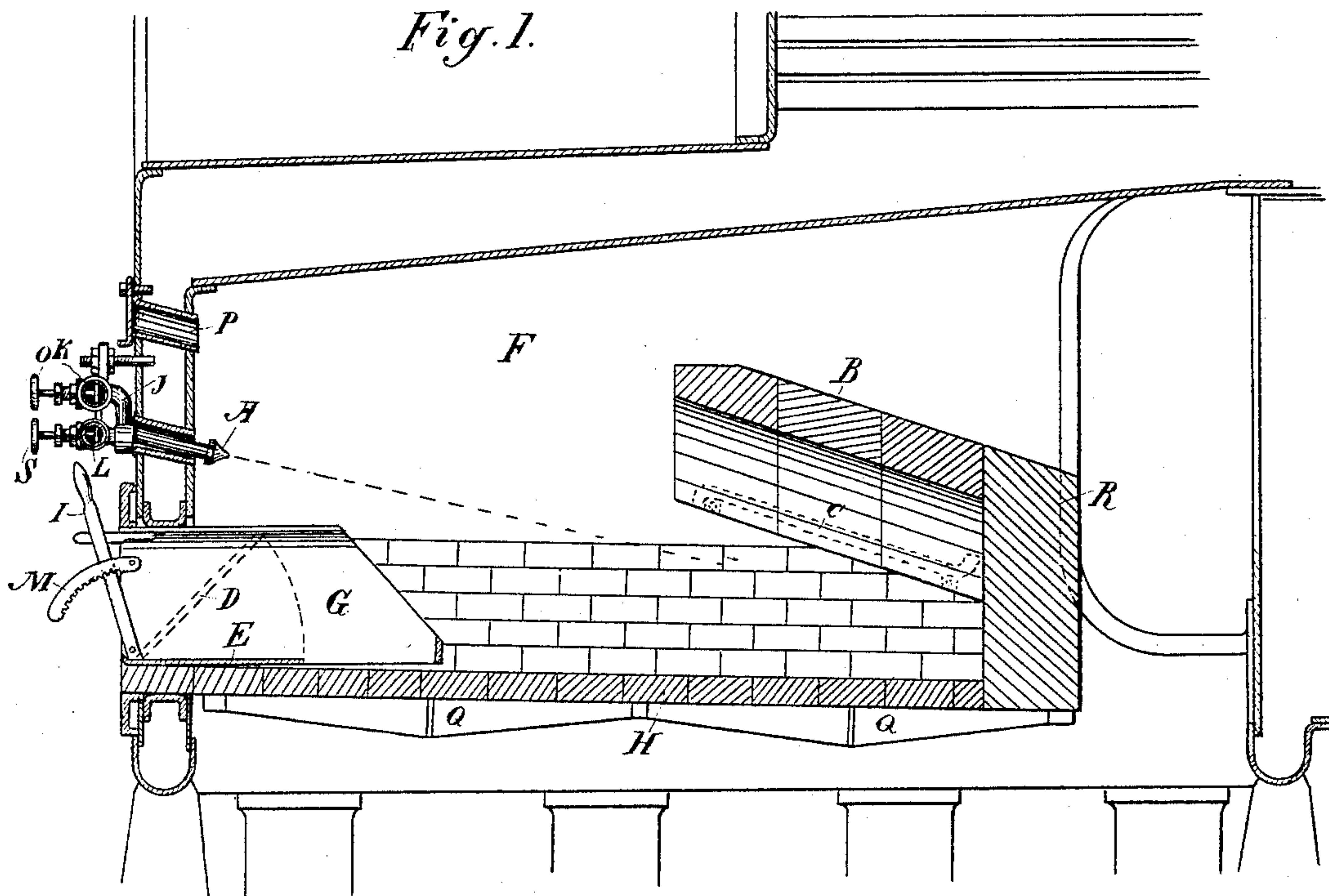
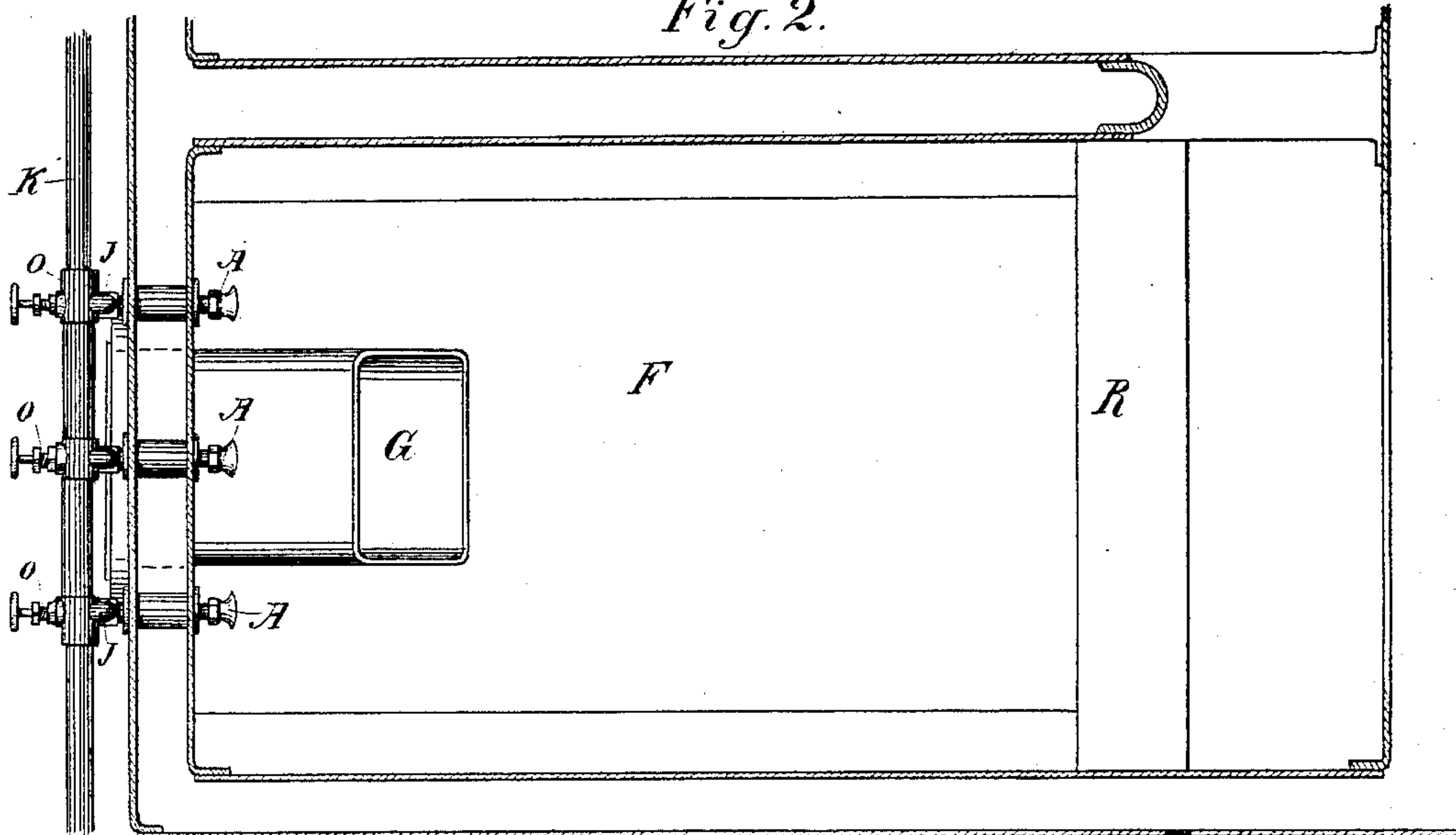


Fig. 2.



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Fig. 3.

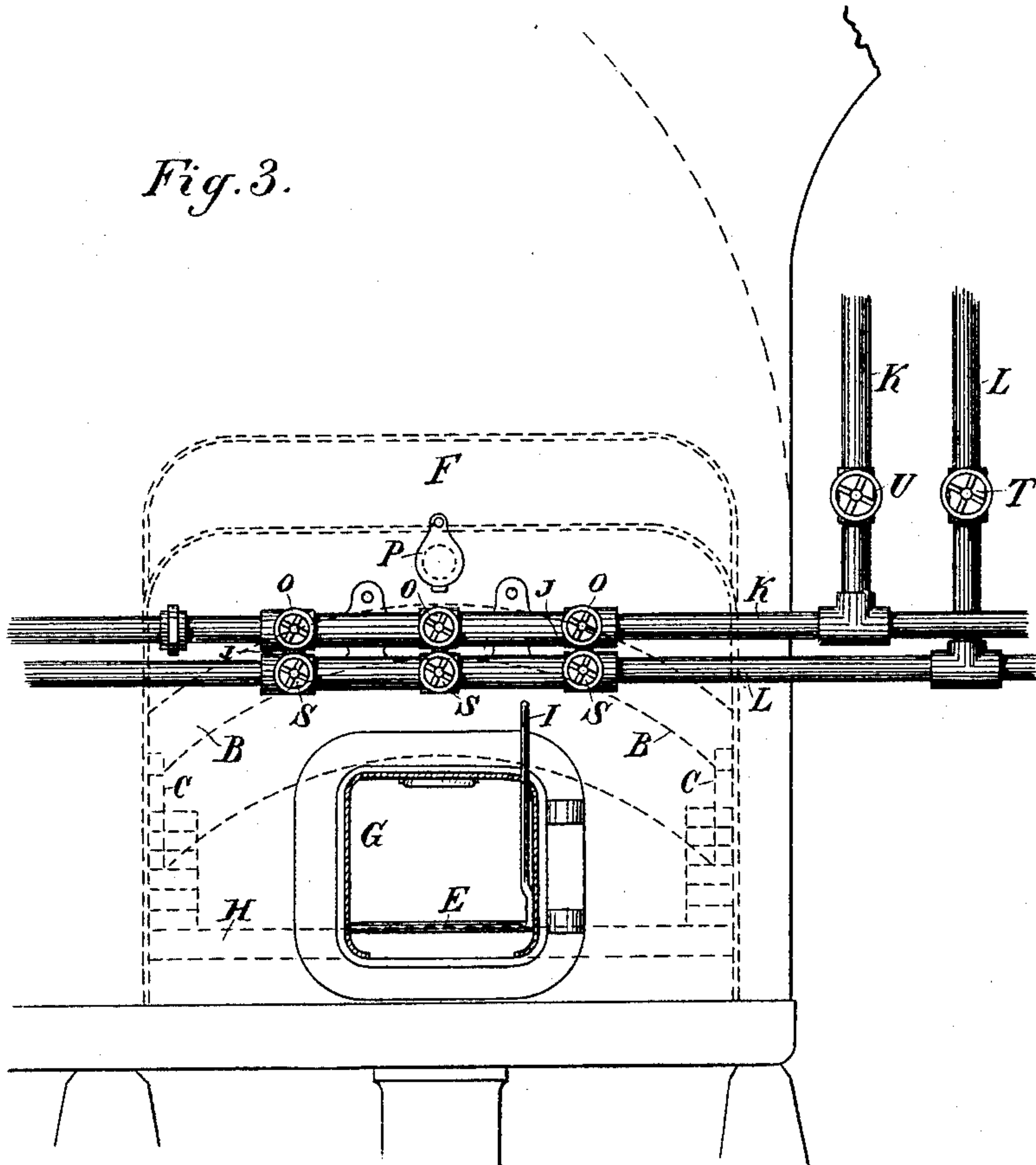


Fig. 4.

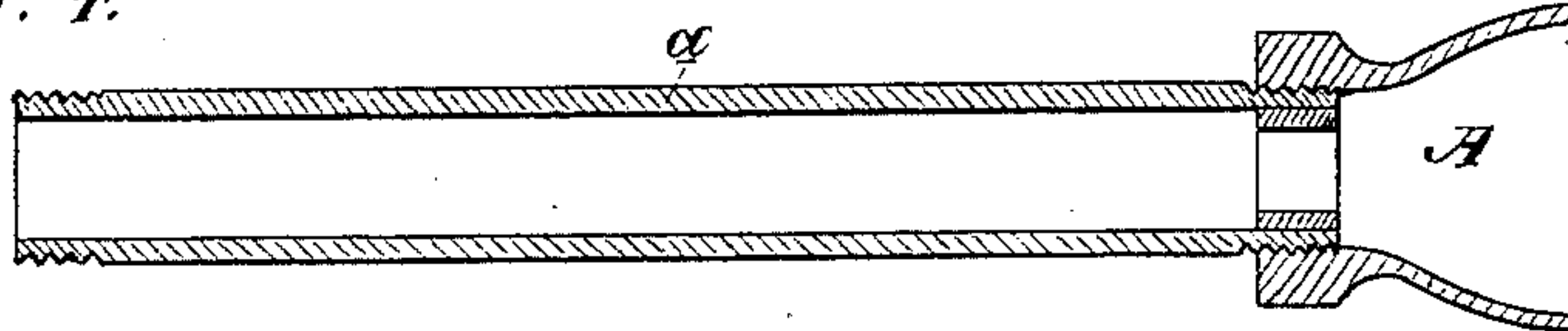


Fig. 6.

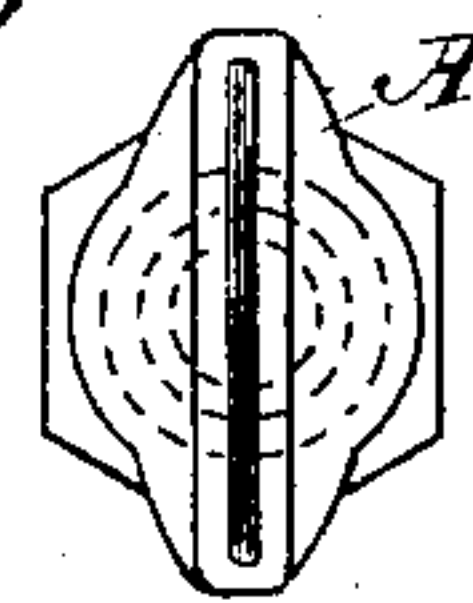
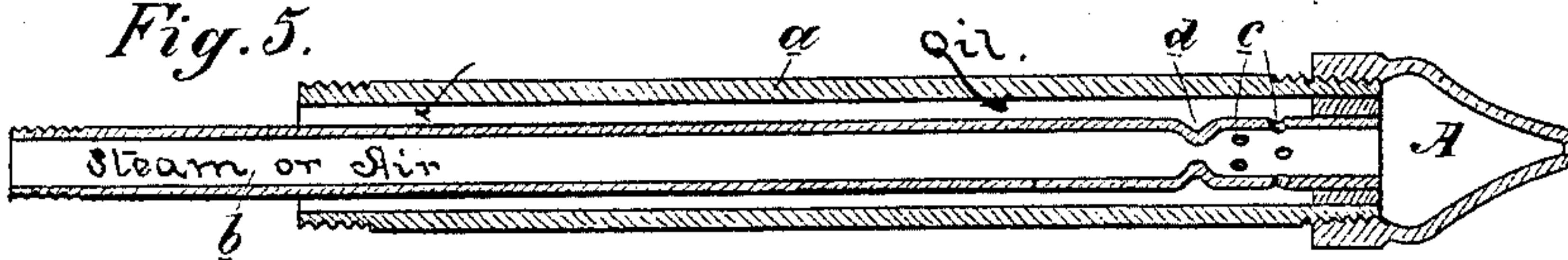


Fig. 5.



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UNITED STATES PATENT OFFICE.

ANDREW J. STEVENS, OF SACRAMENTO, CALIFORNIA.

APPARATUS FOR BURNING PETROLEUM.

SPECIFICATION forming part of Letters Patent No. 348,700, dated September 7, 1886.

Application filed October 15, 1885. Serial No. 180,027. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. STEVENS, of Sacramento, Sacramento county, State of California, have invented an Improvement in Apparatus for Burning Petroleum; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements for the burning of petroleum or hydro-carbon oils, and it is especially adapted to such combustion in connection with steam-boiler furnaces.

It consists in the devices, which will be more fully described by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section taken through the boiler-furnace, inlet-pipes, and air-passages. Fig. 2 is a horizontal section taken through the upper part of the furnace. Fig. 3 is a front view. Figs. 4, 5, and 6 are enlarged views of the atomizer.

In the present case I have shown my invention as applied to a marine-boiler furnace, and it will be manifest that the same construction or a slight modification or change thereof may be employed for furnaces of different forms and for different uses.

F is the furnace, which may be of the usual or any suitable construction.

R is the bridge-wall at the rear end, and Q are the grate-bars or supports upon which the tight bottom H, of fire-brick or other suitable material, is placed, so that no air may be enter the furnace from below.

B is an arch extending upward and forward from the bridge-wall R toward the front of the fire-box, this arch being properly supported by bars C upon each side.

The atomizer for the oil consists of nozzles A, which have a narrow slit extending horizontally, so that the oil and steam or air may be discharged through this slit in a thin and broad sheet, which spreads from side to side after it leaves the nozzle. These nozzles are placed sufficiently near together, so that the sheet of inflamed material will be continuous from one side of the furnace to the other.

The atomizer consists of two concentric tubes, a and b, in connection with the nozzle A, into which they are screwed or otherwise fastened, as shown in Figs. 4 and 5. The exterior tube receives the oil, which flows along through it

until it reaches the closed end just at the rear of the nozzle A, where it is admitted through holes c into the interior steam or air tube, b. This tube is reduced in diameter or choked, so as to form a neck, at d, through which the passing steam is compressed, and as this neck is just behind the holes c, through which the oil enters the pipe, the pressure of steam is somewhat reduced at that point by reason of the construction, so that oil is allowed to flow into the inner pipe without any back-pressure, such as might occur if the pipe b were of the same size throughout. The steam striking the oil as it enters the pipe reduces it to a fine spray, and the steam and oil together pass into the nozzle A, the rear portion of which is considerably enlarged, so as to allow the oil to be still further expanded and atomized as it passes into the nozzle. The fine spray or vapor thus produced is discharged through the narrow horizontal slit of the nozzle, which reduces it to the finest possible spray or vapor, thus completing the atomizing of the oil by what may be considered as three successive and continuous operations, so that it may be called a "triple atomizer." These nozzles are so set with relation to the furnace as to discharge their contents toward the rear and lower portion in the direction of the bridge-wall R and beneath the arch B.

Within the space which is ordinarily devoted to doors for the introduction of coal or other fuel into a furnace is fixed a tubular metal frame, G, through which air is allowed to enter the lower part of the furnace and come in contact with the lower portion of the broad sheet of inflamed oil which has been injected into the furnace by the atomizers before described. Within this air-inlet is fitted a damper, D, which is hinged so that by means of a lever, I, it may be turned about its hinges and closed, as indicated at D, or thrown wide open, as shown at E.

M is a rack by which the lever and damper may be held at any desired point, so as to regulate the flow of air through the inlet-passage G. This inlet supplies a strong current of air, the oxygen of which, striking the inflamed body of oil which is injected into the furnace, produces a strong combustion of the same as it is discharged into the partially-inclosed portion of the furnace formed by the

arch and bridge-wall before described, so that the action therein is similar to that of a retort, maintaining the body of inflamed gas and carbon at a white heat. The products of combustion then return, passing over the top of the arch B, and thence into the tubes or flues through the boiler, or beneath the boiler behind the bridge-wall, according to the particular construction which may be used. By this construction I am enabled to introduce a large body of air, and by discharging it into the furnace in a plane nearly parallel with that of the incoming sheet of inflammable gas or oil it unites therewith, so as to produce a very perfect combustion, and the temperature of the air is raised so highly before it passes over the arch and into contact with the crown-sheet of the furnace or the tubes of the boiler that there is no danger of ill effect on account of the admission of cold air. The steam and oil are conveyed through pipes L and K, respectively, which lead horizontally along the front of the furnace or furnaces, having stop-valves at T and U, and steam-regulating valves for each nozzle at S, and oil-regulating valves at O. The oil-pipe K is connected so that oil will flow from it into the pipe *a* of the atomizer by means of a curved pipe, J, through which it flows by gravitation until it reaches the inlet-openings *c*, before described.

P is a peep-hole through which the interior of the boiler may be inspected at any time.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The exterior oil-conveying pipe fixed in the rear end of the nozzle which serves to close it, in combination with the interior steam or air conveying pipe having an annular series of holes or openings made through it just behind and in close proximity to the nozzle, and the nozzle having an enlarged chamber at the rear and a narrow slit or discharge-opening at the front, substantially as herein described.

2. The exterior oil-conveying pipe closed at the front, and the interior steam or air conveying pipe having openings near the front, through which oil may be admitted into it from the exterior pipe, said steam-pipe being contracted at the point just behind these openings, in combination with a nozzle having an enlarged chamber, into which the interior pipe discharges, and a narrow slit or opening at the front, substantially as herein described.

In witness whereof I have hereunto set my hand.

ANDREW J. STEVENS.

Witnesses:

BERT. A. WORTHINGTON,
GEO. R. DRIGGS.