

No. 652,085.

Patented June 19, 1900.

C. W. CLAYBOURNE.
MIXER FOR GAS OR OTHER BURNERS.

(Application filed Jan. 16, 1900.)

(No Model.)

2 Sheets—Sheet 1.

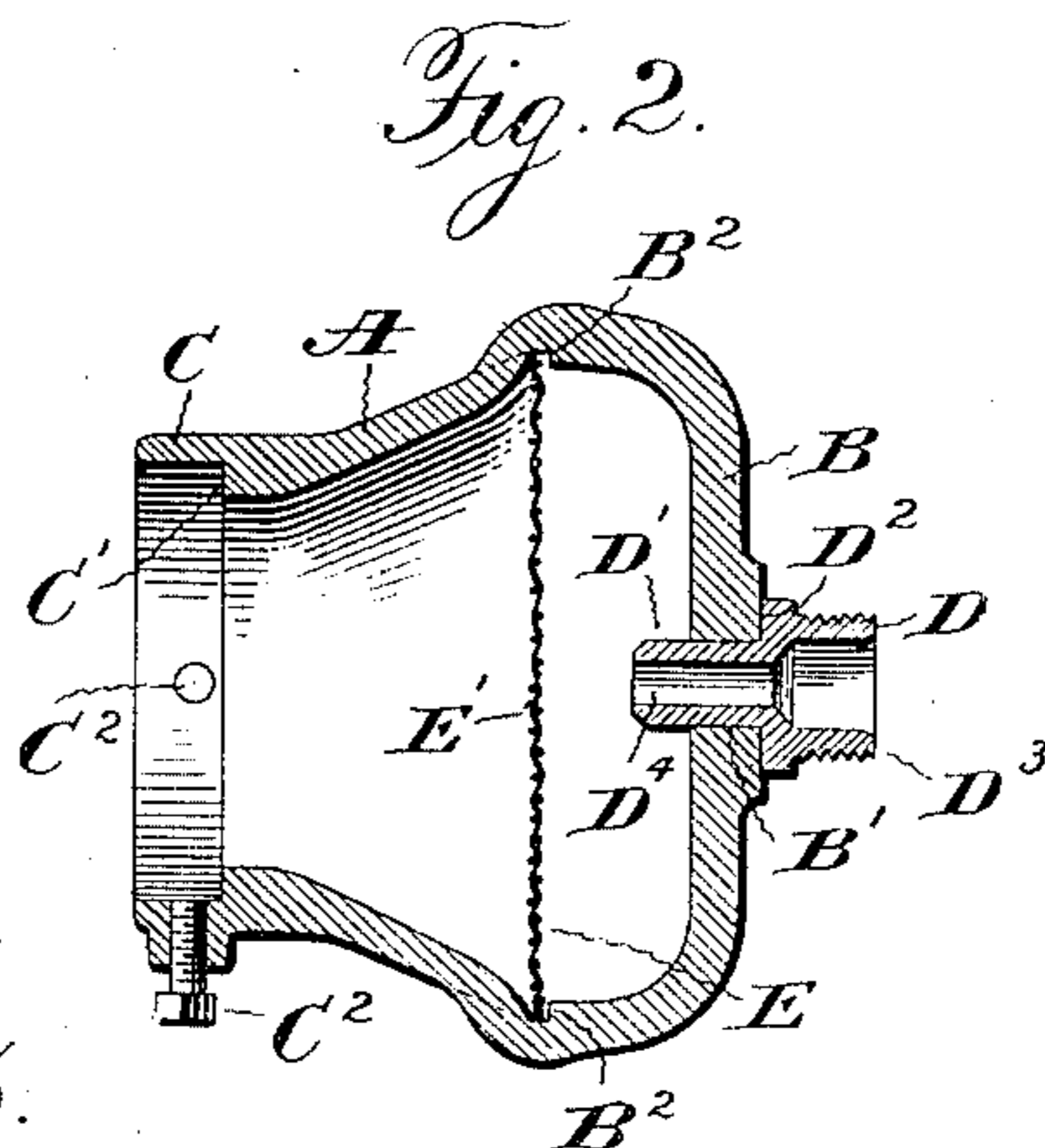
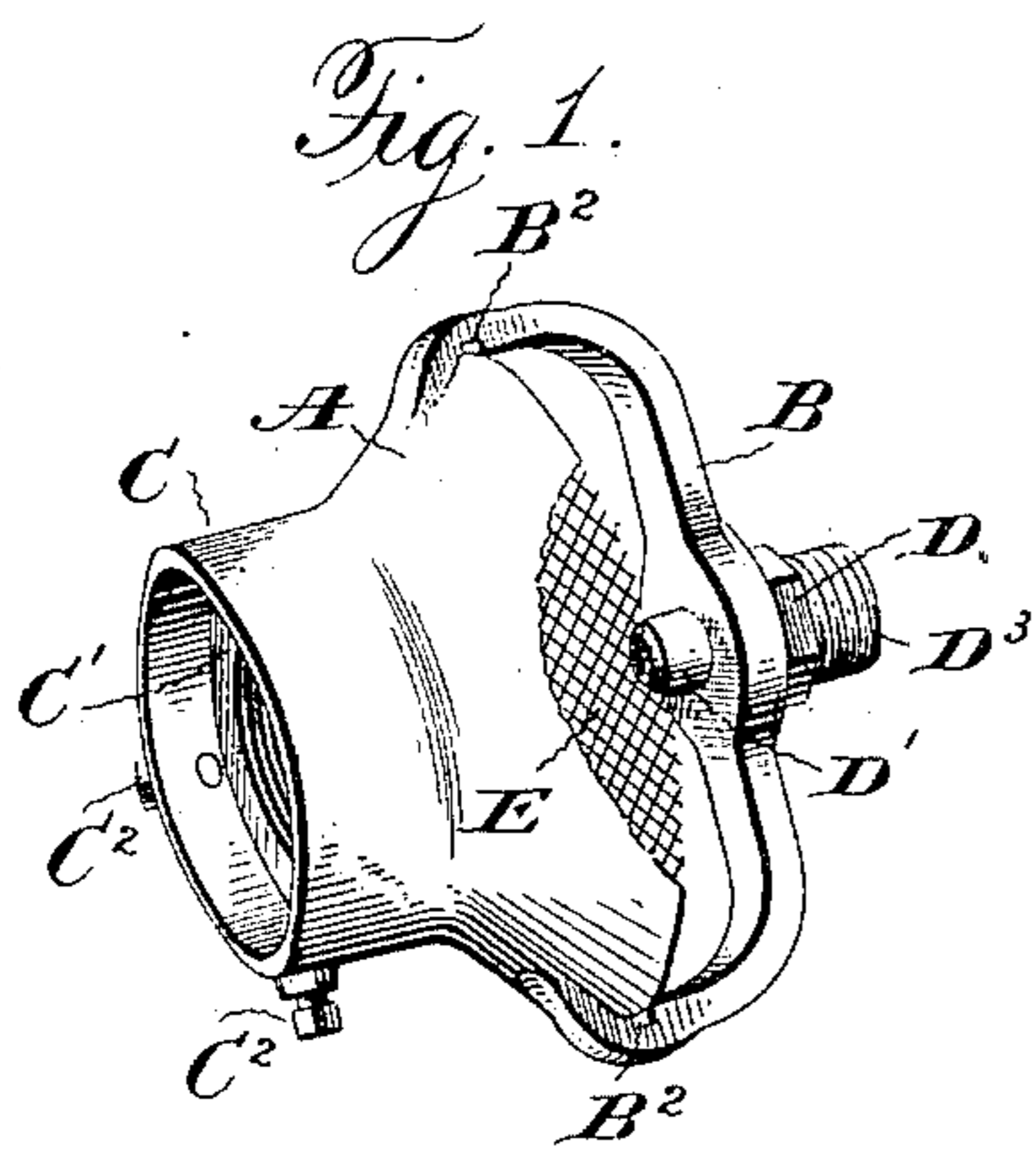


Fig. 3.

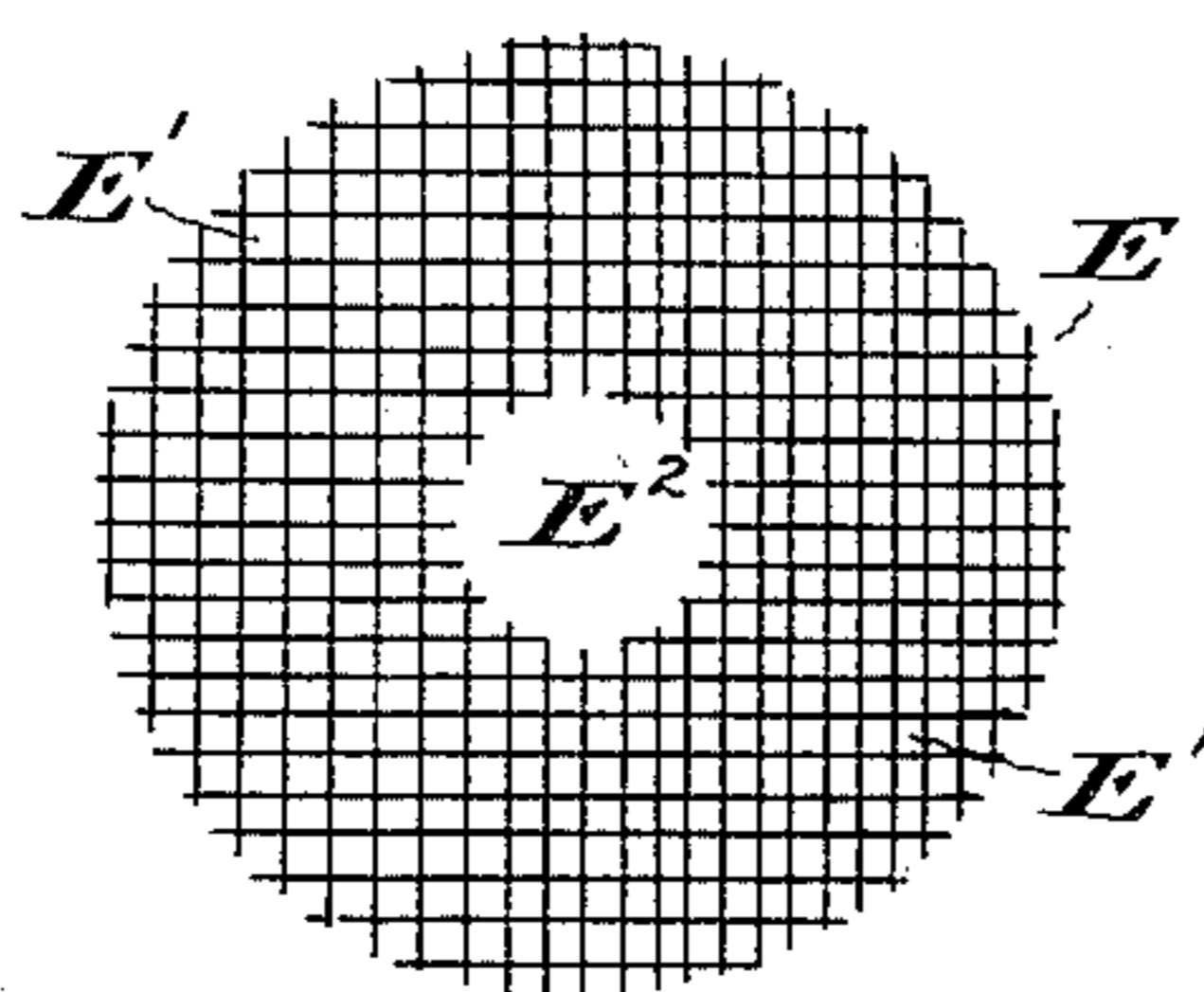


Fig. 4.

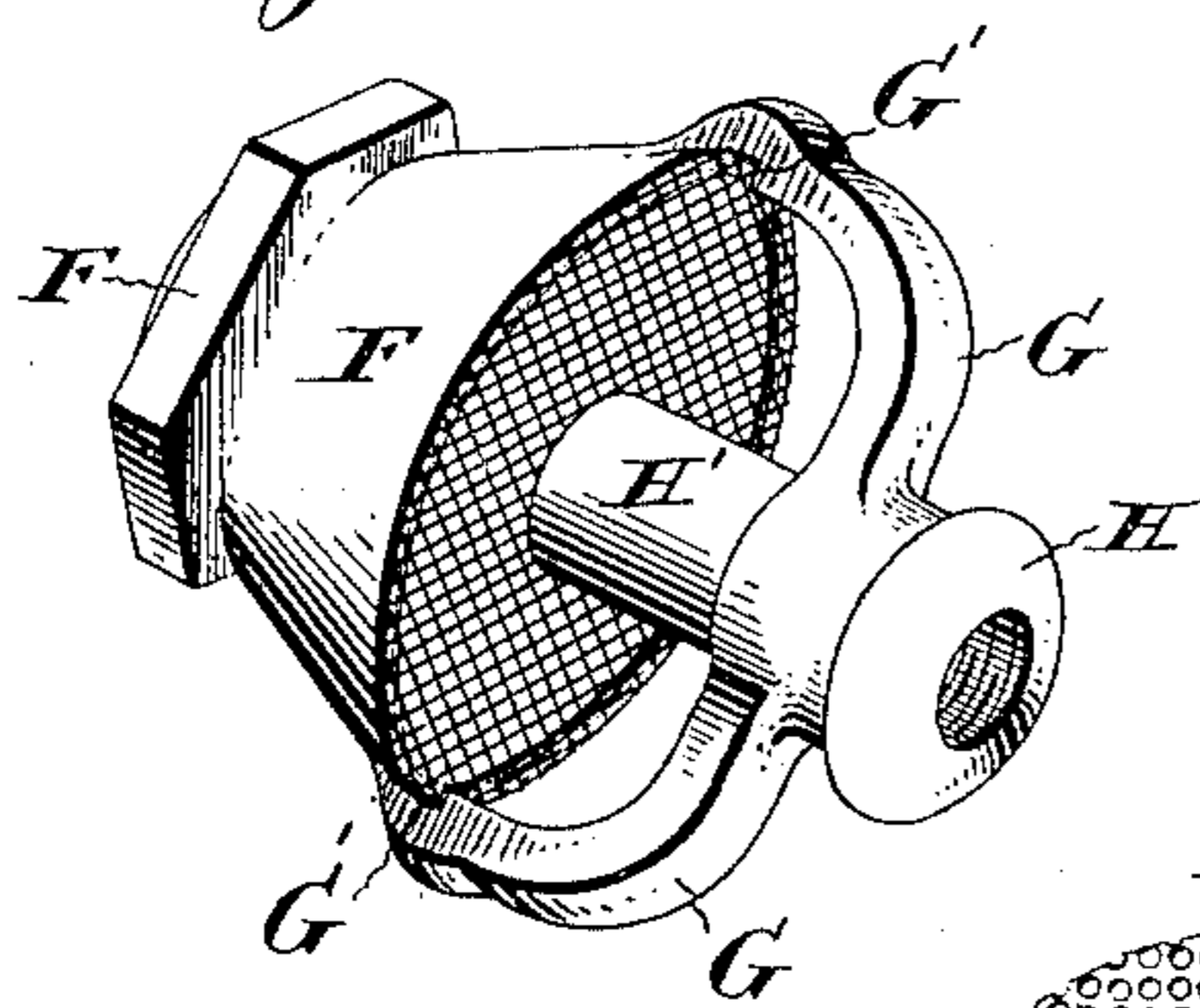


Fig. 5.

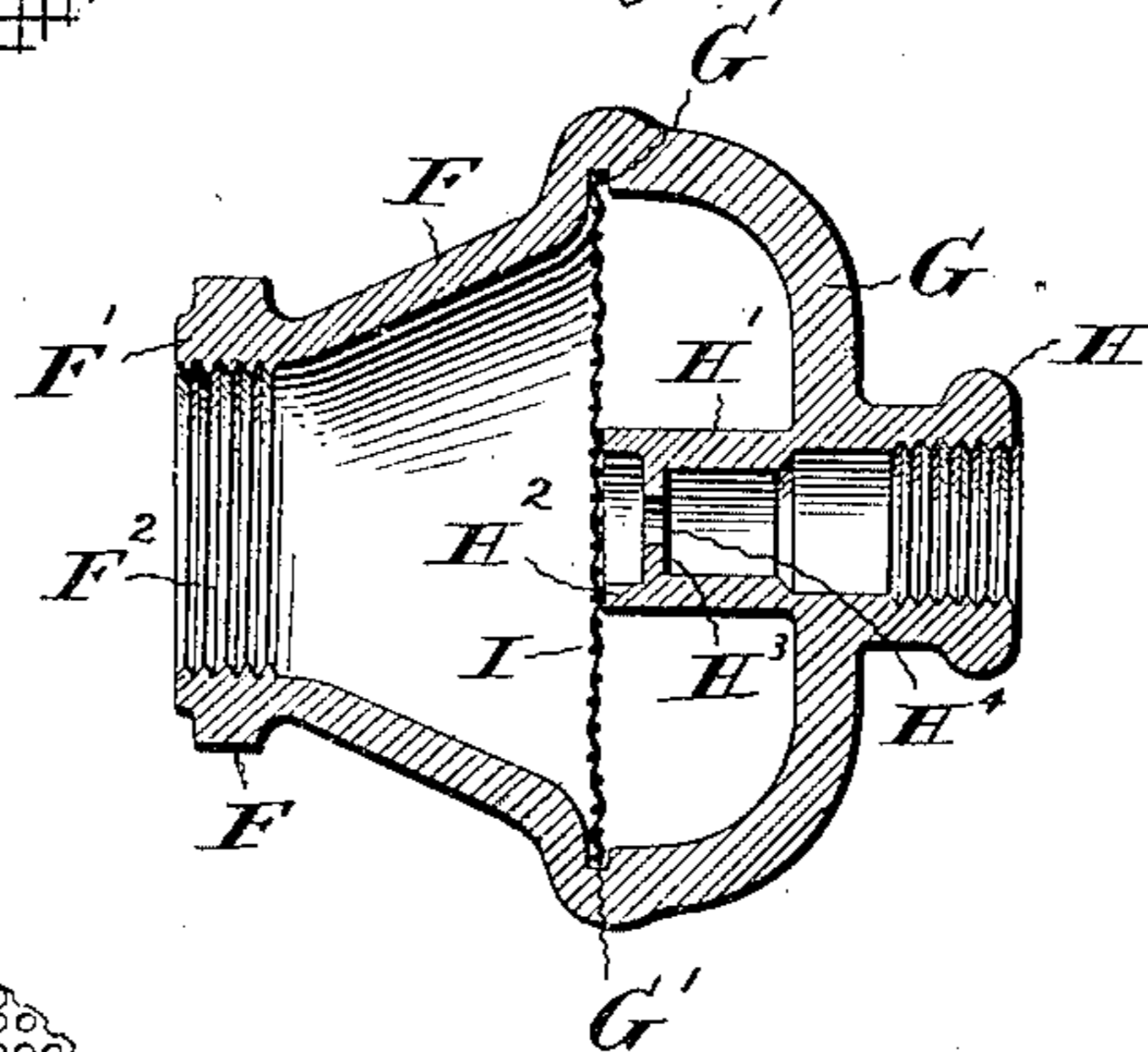
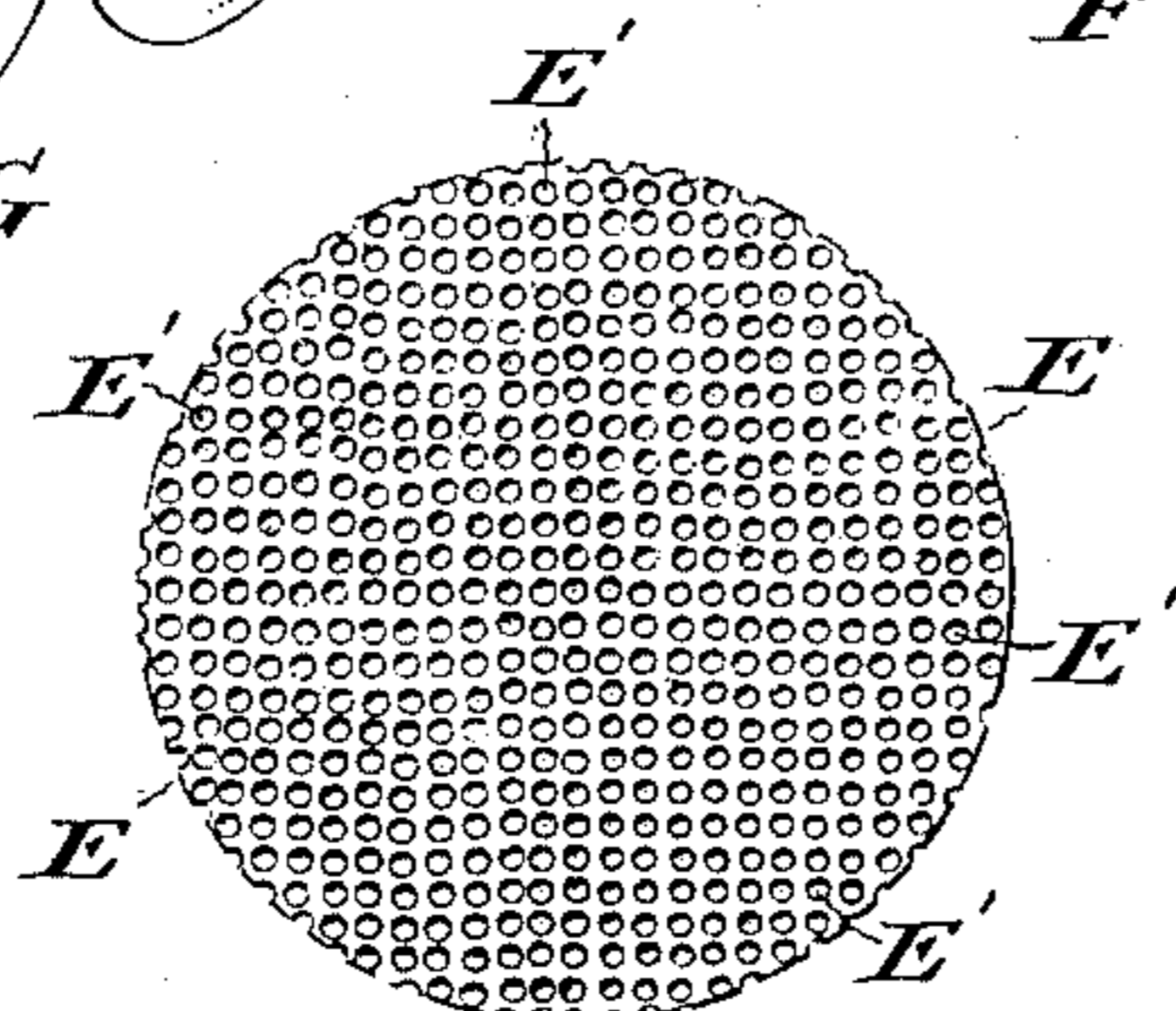


Fig. 6.



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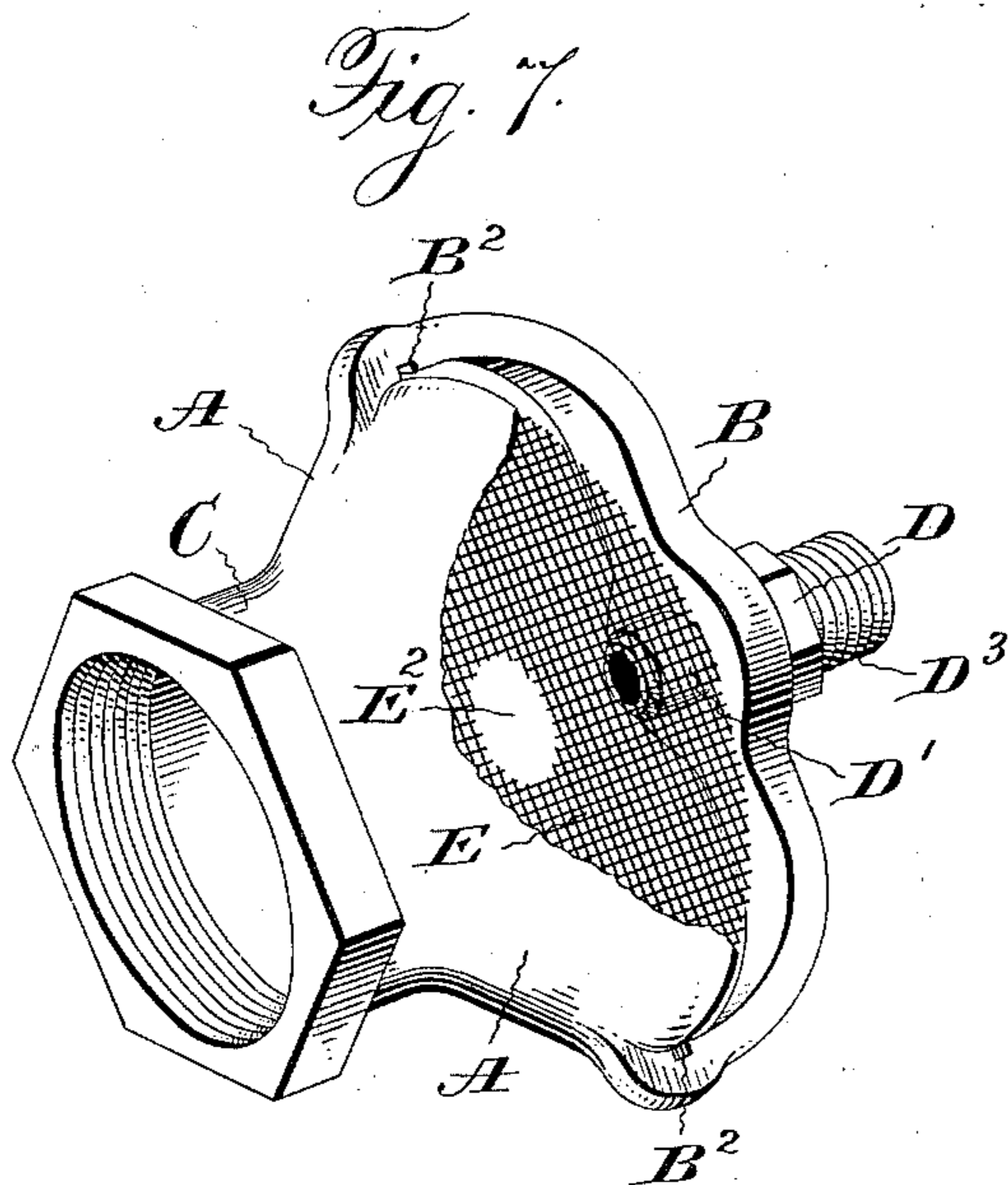
C. W. CLAYBOURNE.

MIXER FOR GAS OR OTHER BURNERS.

(Application filed Jan. 16, 1900.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

COLIN W. CLAYBOURNE, OF INDIANAPOLIS, INDIANA.

MIXER FOR GAS OR OTHER BURNERS.

SPECIFICATION forming part of Letters Patent No. 652,085, dated June 19, 1900.

Application filed January 16, 1900. Serial No. 1,684. (No model.)

To all whom it may concern:

Be it known that I, COLIN W. CLAYBOURNE, of Indianapolis, in the county of Marion, and in the State of Indiana, have invented certain new and useful Improvements in Mixers for Gas or other Burners; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my mixer, the body being partially broken away. Fig. 2 is a longitudinal sectional view of the mixer shown in Fig. 1. Fig. 3 is a plan view of a modified form of perforated diaphragm for use in my mixer. Figs. 4 and 5 are views similar to Figs. 1 and 2 and show a modified form of my mixer. Fig. 6 shows another form of perforated disk for use in my mixer. Fig. 7 is a view illustrating the diaphragm shown in Fig. 3 in position in a mixer.

The object of my invention is to provide a mixer for gas and other burners in which the fuel shall be most perfectly consumed whatever may be the pressure thereof; and to this end said invention consists in the mixer constructed substantially as and for the purpose hereinafter specified.

Referring to Figs. 1 and 2, the mixer consists of a hollow, preferably frusto-conical, body A, although the body may have any other shape that is desired, which body has at its rear end a yoke B and at its front end a cylindrical neck C, by which the mixer may be attached to a flange through which the mixture of air and gas may pass to the point where it is burned. For the purpose of such attachment an annular shoulder C' is formed within said cylindrical neck C for abutting against the end of the flange, and two set-screws (more or less) C² C² are threaded into such neck for engagement with the flange. The yoke B at the rear end of the mixer-body A has an opening B', in which a gas-nozzle D is supported preferably in axial alinement with the mixer-body. The gas-nozzle D has a cylindrical portion D' to fit in the opening B' in the yoke, and at the rear of the cylindrical portion is a shoulder D², which abuts against the rear surface of the yoke. The rear end D³ of the gas-nozzle is screw-threaded, or it can be provided with a set-screw for the attachment of the pipe through which the

gas is supplied. The passage D⁴ through the gas-nozzle is contracted toward its front end to concentrate the gas and increase its speed as it issues therefrom. A perforated diaphragm E extends across the rear end of the mixer-body A and is preferably maintained in place by being fitted into notches B² and B², formed in the arms of the yoke B, where they join the mixer-body. The gas-nozzle may, as shown, extend only part of the way toward the diaphragm, or it may extend to said diaphragm, or through the latter and into the mixer-chamber. The perforated diaphragm E is preferably provided with a large number of openings E' and E', and may be formed of wire-netting or of perforated sheet metal, as shown in Fig. 6, or of any other form of material or substance that is desired. As shown in Fig. 3, the diaphragm E may be cut out at E² around or in front of the gas-nozzle D, so that it is interposed only in the path of the air.

The form of mixer shown in Figs. 4 and 5 has like that before described a frusto-conical body F, at the rear end of which a yoke G supports a gas-nozzle H in axial alinement with the mixer-body. A perforated diaphragm I extends across the rear end of the mixer-body and may be held in place by engaging notches G' and G' in the arms of the yoke G. The gas-nozzle H in this case consists of a tube H', extending about to the plane of the rear end of the mixer-body F; but such nozzle may extend slightly beyond such plane, so that it will bear upon the perforated diaphragm I and hold the latter in place. Within the tube H' of the gas-nozzle H and a short distance back of the mouth H² of said nozzle is a partition H³, having a hole H⁴ there-through, the effect of such construction being to spread the gas into a wide or flaring jet. The forward end F' of the mixer-body is provided with an internal screw-thread F² for engagement with a pipe or other passage for the mixture of air and gas and with parallel shoulders F³ for the engagement of a wrench. The forward end of this mixer can be provided with a set-screw, as in the form shown in Figs. 1 and 2, instead of using the screw-thread.

The operation of my mixer is as follows: The gas issues from the gas-nozzle and strikes

the perforated diaphragm, where it is deflected by the metal between the perforations into a number of streams flowing in different directions. These streams of gas strike the
 5 air before them and engage by friction the air through which they pass, carrying the air along with them and commingling therewith, being aided in such action by the tapering form of the chamber. This action creates a
 10 partial vacuum in the mixer-chamber and draws in air through the perforated diaphragm, which air in striking the material between the perforations is, like the gas, broken up into a large number of streams having dif-
 15 ferent directions. The result of the action of the diaphragm both on the air and the gas is an intimate mixture and remixture thereof, so that each combustible element of the gas is in the presence of the proper quantity
 20 of oxygen to produce perfect combustion.

A mixer in which the diaphragm extends only over the air-entrance and not over the gas-nozzle is very efficient, although I prefer to break up the stream of gas, as well as the
 25 air, into small streams.

The flow and pressure of the gas can be regulated by a valve on the gas-supply pipe, and the easily-removable diaphragm furnishes a convenient means for regulating the
 30 supply of air, since a diaphragm having a greater or less area of openings therein can be substituted for one which does not admit the requisite quantity of air.

It will be observed that while my mixer
 35 performs its function in a most efficient manner it offers a minimum resistance to the passage of the gas and air through it, for the gas strikes the air in such an advantageous manner that it easily produces the desired inflow
 40 of air, and the air, meeting only with the resistance of the perforated diaphragm, enters so readily as to require but little pressure on the part of the gas.

This mixer has been found to work to such
 45 advantage at low pressure that when the pressure of the gas falls below the normal, as frequently happens, the degree of combustion is not lessened, as in the ordinary burner. Moreover, my mixer being capable of nor-
 50 mally operating with a low pressure of gas results in greater economy than is possible

with a burner using a high pressure of gas, for the reason that with the high pressure the gas is projected through the flame at such speed that some of it passes beyond the point
 55 where the heat is sufficient for the combustion before it has been consumed, while the lower pressure and consequent slower speed permit the gas to be fully consumed before it has passed the zone of combustion. 60

While I have described my mixer as adapted for use with gas, I wish it to be understood that it is well adapted for use with any fuel that is burned in a jet or spray, such as the hydrocarbons. 65

Having thus described my invention, what I claim is—

1. A mixer for gas and other burners, consisting of a mixing-chamber which is open at both ends and which tapers from its entrance
 70 toward its exit, a perforated diaphragm extending across said chamber at the entrance end, and a gas-inlet directed toward said diaphragm and placed on the entrance side of said diaphragm, substantially as and for the
 75 purpose specified.

2. A mixer for gas and other burners, consisting of a mixing-chamber having an entrance and an exit and tapering from said entrance toward said exit, a perforated dia-
 80 phragm extended across said chamber at the entrance thereof and a gas-inlet directed toward the entrance side of said diaphragm and adapted to emit a flaring stream of gas, substantially as and for the purpose specified. 85

3. A mixer for gas and other burners, consisting of a mixing-chamber having an entrance and an exit, such chamber tapering from its entrance toward its exit, a perforated
 90 diaphragm extended across said chamber at its entrance, a gas-inlet directed toward such entrance, said diaphragm being cut away opposite such gas-inlet, substantially as and for the purpose specified.

In testimony that I claim the foregoing I
 95 have hereunto set my hand this 23d day of December, A. D. 1899.

COLIN W. CLAYBOURNE.

Witnesses:

L. C. WILLIAMS,
 KATE L. BLADE.