

(No Model.)

2 Sheets—Sheet 1.

A. A. PHILLIPS.
MIXER FOR NATURAL GAS.

No. 434,948.

Patented Aug. 26, 1890.

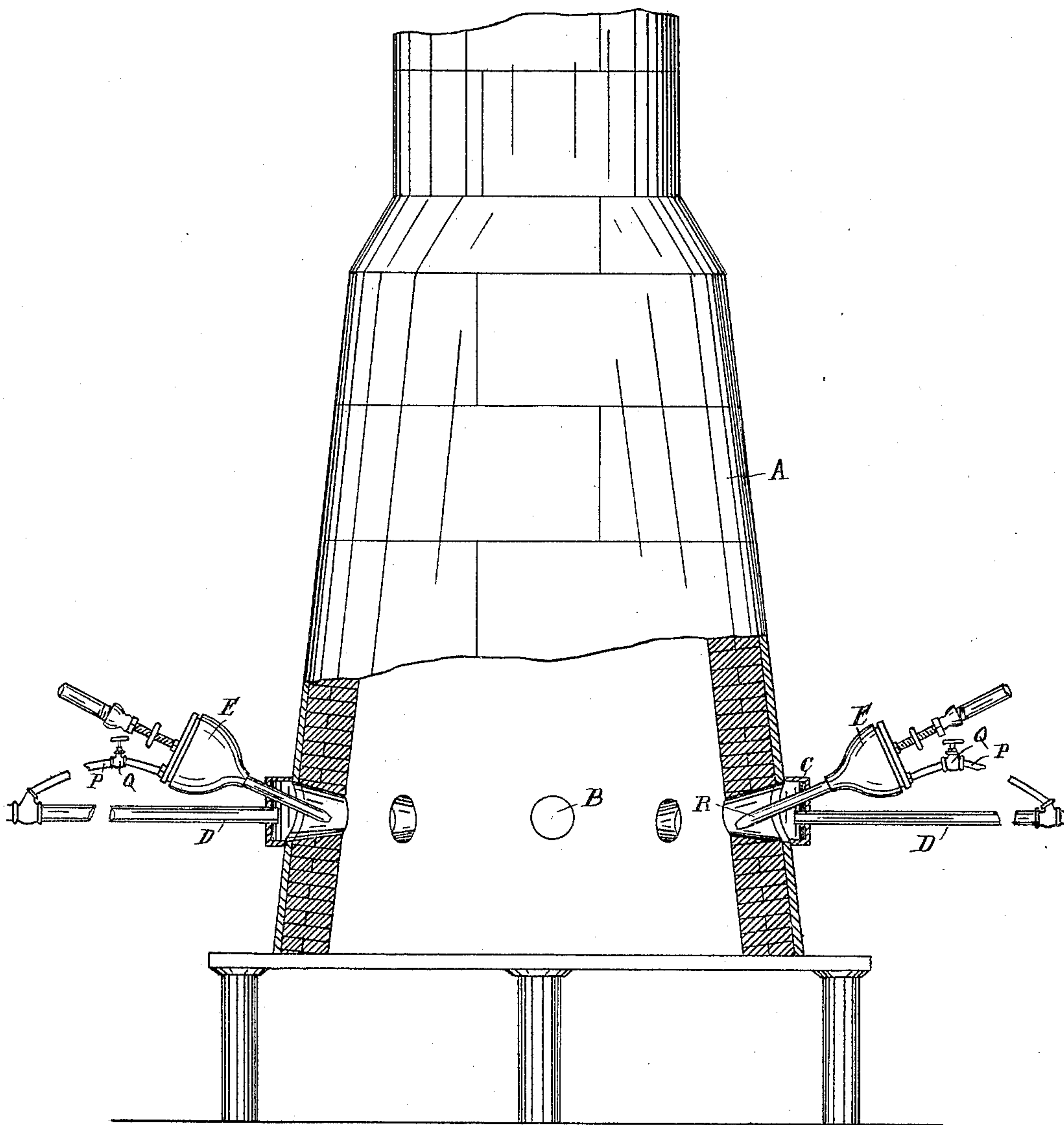


Fig. 1.

WITNESSES

Carroll J. Webster
Anna Leaney

INVENTOR

Ambrose A. Phillips
By William Webster
Atty

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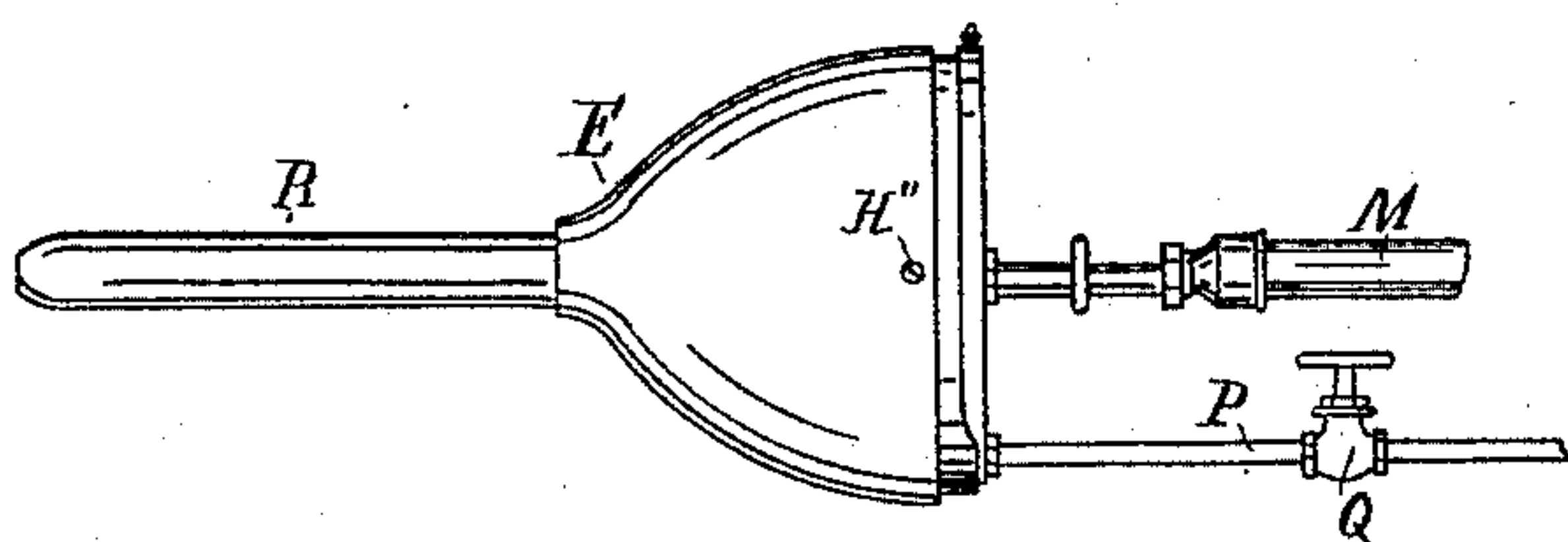


Fig. 2

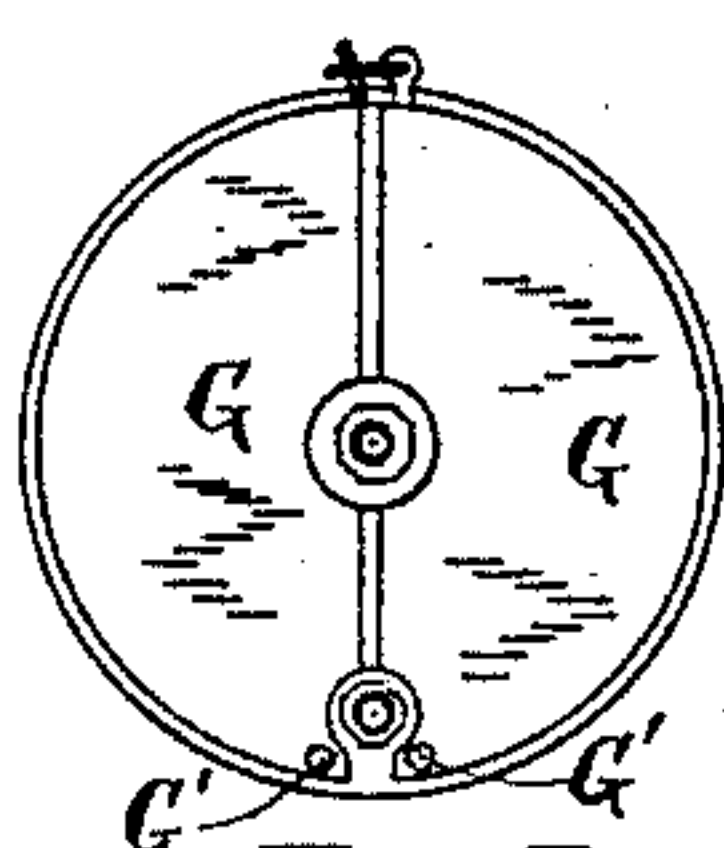


Fig. 3

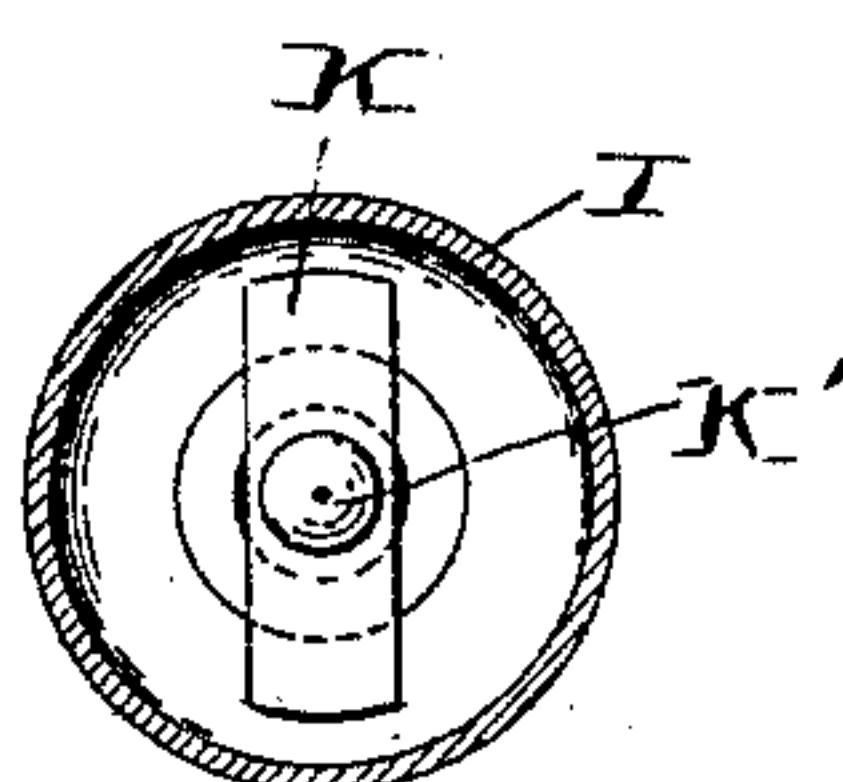


Fig. 4

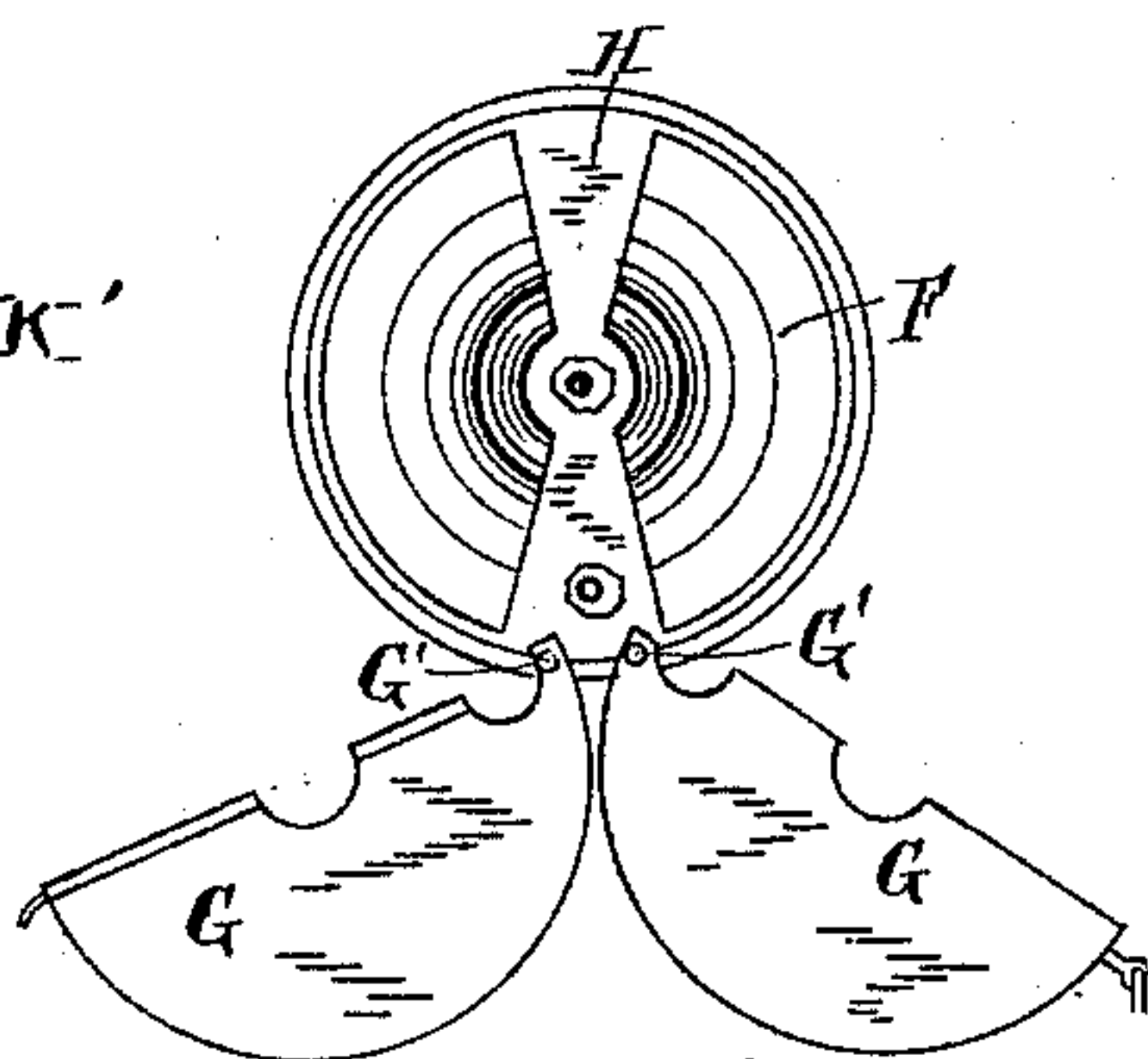


Fig. 5

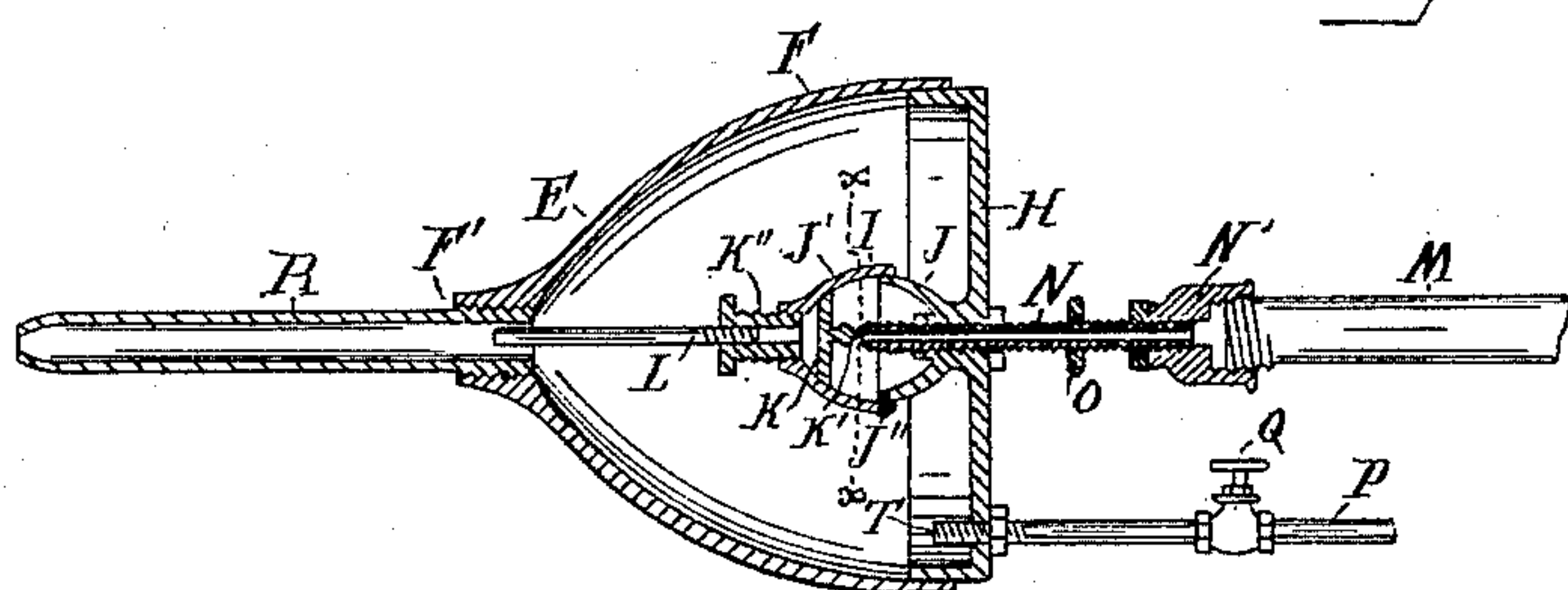


Fig. 6

WITNESSES

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UNITED STATES PATENT OFFICE.

AMBROSE A. PHILLIPS, OF TOLEDO, OHIO, ASSIGNOR OF ONE-HALF TO
ROBERT A. WALLACE, OF CHICAGO, ILLINOIS.

MIXER FOR NATURAL GAS.

SPECIFICATION forming part of Letters Patent No. 434,948, dated August 26, 1890.

Application filed December 7, 1888. Serial No. 292,875. (No model.)

To all whom it may concern:

Be it known that I, AMBROSE A. PHILLIPS, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have
5 invented certain new and useful Improvements in Mixers for Natural Gas; 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
10 it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification,

My invention relates to mixers for natural
15 gas, and has for its object to provide a mixer whereby atmospheric air may be incorporated with the so-called "natural gas" in such proportion as may be desired to insure a perfect combustion, and also that the amount of gas
20 supplied to the mixer may be conveniently regulated.

A further object is to provide a mixer with means for supplying a current of atmospheric air under pressure either as an auxiliary to the natural draft, or as an independent air-supply.
25

A still further object is to provide for mixing the air and gas in a manner that shall preclude the possibilities of a back-current
30 of air within the mixer, thereby varying the flow of gas to the combustion-chamber.

I have illustrated my improved mixer in connection with a cupola for melting metals, it being especially adapted for this purpose,
35 and in order that the same may be more fully understood I will describe it in connection therewith.

The invention consists in the parts and combination of parts hereinafter described,
40 and pointed out in the claims.

In the drawings, Figure 1 is an elevation of a cupola for melting metals, the lower portion being broken away to disclose the interior, so as to illustrate the arrangement of my improved mixer when in use therein. Fig. 2 is a side elevation of a complete mixer. Fig. 3 is an end view with the wings or dampers closed. Fig. 4 is a like view showing the wings or dampers opened. Fig. 5 is a central
50 vertical longitudinal section. This figure is drawn on an enlarged scale. Fig. 6 is a de-

tail transverse sectional view of the shell I, taken on line *x x*, Fig. 5.

A designates the cupola; B, the tuyere-holes; C, the air-belt surrounding the cupola and
55 into which the air-pipes D from the blower are inserted. So far I have described a common form of cupola.

E designates the mixer, consisting of a conoidal shell F, having a screw-threaded
60 opening F' at the apex, and closed at the base by means of wings or dampers G, pivoted at G' to a cross-bar H, formed integral with a ring of a diameter to fit closely within the shell and be secured therein by screws H'' or
65 in any preferred manner.

I designates an oblong case within the mixer and consisting of two cup-like sections J and J', the section J being formed integral with cross-bar H and of a diameter to telescope within section J' a short distance, forming a tight case, the sections being held in position by screws J''. The section J' is provided with a cross-bar K near its taper end, said bar carrying a conical stud K' at or near
75 its center, the purpose of which will appear farther on. At the taper end of the section J' is a threaded aperture, into which is screwed a tube or collar K'', said tube or collar being
80 also threaded internally and adapted to receive a pipe L in its bore, which pipe is of a length sufficient to extend from the tube K'' into the apex of the shell F.

M designates the gas-supply pipe leading from any preferred source and coupled to a
85 pipe N by means of a reducing-coupling N', the pipe N being screw-threaded and screwed into a screw-threaded perforation made at or near the center of the cross-bar H, whereby the said pipe is brought into alignment with
90 the conical stud K' in section J' of case I, and acts as a valve to regulate or entirely shut off the flow of gas to the mixer when screwed to or from the stud K', collar O, secured upon pipe N, serving as a convenient
95 means of turning the pipe, the coupling N' being screw-threaded a sufficient distance to allow the pipe N, to be moved the desired amount to regulate or shut off the flow of gas without affecting the joint.

P designates an auxiliary pipe tapped into air-pipe D and communicating with the inte-
100

rior of the mixer, air being admitted or closed therefrom by means of a cock Q in said pipe.

R designates the exit-pipe for the intermingled air and gas, being screwed into the threaded opening in the apex of the shell, and extending a sufficient distance therein to be concentric with pipe L.

In operation, when, for illustration, the mixer is to be used in smelting ore within a cupola the wings G are opened, and pipe N withdrawn from its seat upon stud K' by unscrewing it, thereby allowing gas to flow into chamber I and find an exit through pipe L into pipe R. Atmospheric air is introduced through the base of the mixer in any desired volume regulated by the open or closed position of wings G, and the air and gas unite within pipe R and are carried forward by the pressure to the point of combustion, it being understood that the flow of gas can be regulated by the relative arrangement of pipe N and stud K' and the flow of air by the open or closed position of the wings of the mixer.

In a variety of uses to which my improved mixer may be put there is danger of a back current of air within the mixer, thereby either entirely cutting off the flow of gas or causing a spasmodic flow, resulting in extinguishing the blaze and endangering life and property. It will be seen that, the gas entering a closed chamber and flowing thence through pipe L, any variation of pressure of atmosphere can take place within the mixer without affecting the flow of gas. In the use to which my mixer is illustrated as particularly applicable—i. e., in cupolas for melting metals—there is at times a necessity for a greater volume of atmospheric air than that furnished by the ordinary draft through the base, and it becomes necessary to introduce air to the cupola under pressure by means of a blower, which air is introduced into the cupola through pipe D. This increased pressure within the cupola would tend (were the wings open and a natural draft relied upon) to cause a backflow of air through the mixer. To avoid this back-pressure, the pipe P is connected with the air-pipe D, and is extended into the mixer at T, as shown, whereby a volume of air from air-pipe D can be admitted to or cut off from the mixer. When the supplemental forced draft is employed, the wings may be closed.

It will be seen that I have provided for any desired flow of gas, and for either a natural draft of atmospheric air variable in degree at the will of the operator, or of a forced draft from the blower.

What I claim is—

1. In a device for mixing air and natural gas, the combination, with a shell having a nozzle

at one end and closed at the opposite end by means of wings or dampers pivoted to a cross-bar formed integral with a ring secured within the shell, of a main gas-supply pipe, a pipe connected with the end of the same and longitudinally adjustable therein, said pipe passing through the cross-bar, and also adjustable therein, a case or box located within the shell and enveloping the inner end of the adjustable gas-supply pipe, a cross-bar within the case carrying a stud adapted for engagement with the end of the pipe to regulate the flow of gas, and an exit-pipe extending from the case into the nozzle of the shell, substantially as shown and described.

2. The combination, with a cupola having an air-belt, of a shell having a nozzle at one end and closed by dampers pivoted to a cross-bar at the opposite end, a longitudinally-adjustable gas-supply pipe passing through the said cross-bar, a fixed stud located within the shell, adapted for engagement with the end of the gas-pipe to regulate the flow of gas, an air-supply pipe also passing through the cross-bar and entering the shell, and the air-pipe D, which enters the air-belt, connected with the air-pipe entering the shell, substantially as and for the purpose set forth.

3. In a mixer for air and natural gas, the combination, with a shell having a nozzle at one end and closed at the opposite end by means of wings or dampers pivoted to a cross-bar formed integral with a ring secured in the shell, of a case located within the shell, and consisting of the sections J and J', the section J' being formed integral with the inner face of the cross-bar, and secured within the section J, a cross-bar located within the section J, and a conical stud carried thereon at or near its center, a tube or collar secured in the tapered end of the section J, and a pipe secured in said tube or collar extending into the nozzle secured in the end of the shell, a main gas-supply pipe, a pipe connected therewith and adjustable therein, said pipe passing adjustably through the cross-bar and entering the case within the shell, the free end of said pipe being adapted for engagement with the conical stud on the cross-bar, whereby the flow of gas is regulated, all of said parts being combined and operated substantially as shown and described.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

AMBROSE A. PHILLIPS.

Witness:

WILLIAM WEBSTER,
ANNA LEHANEY.