

(No Model.)

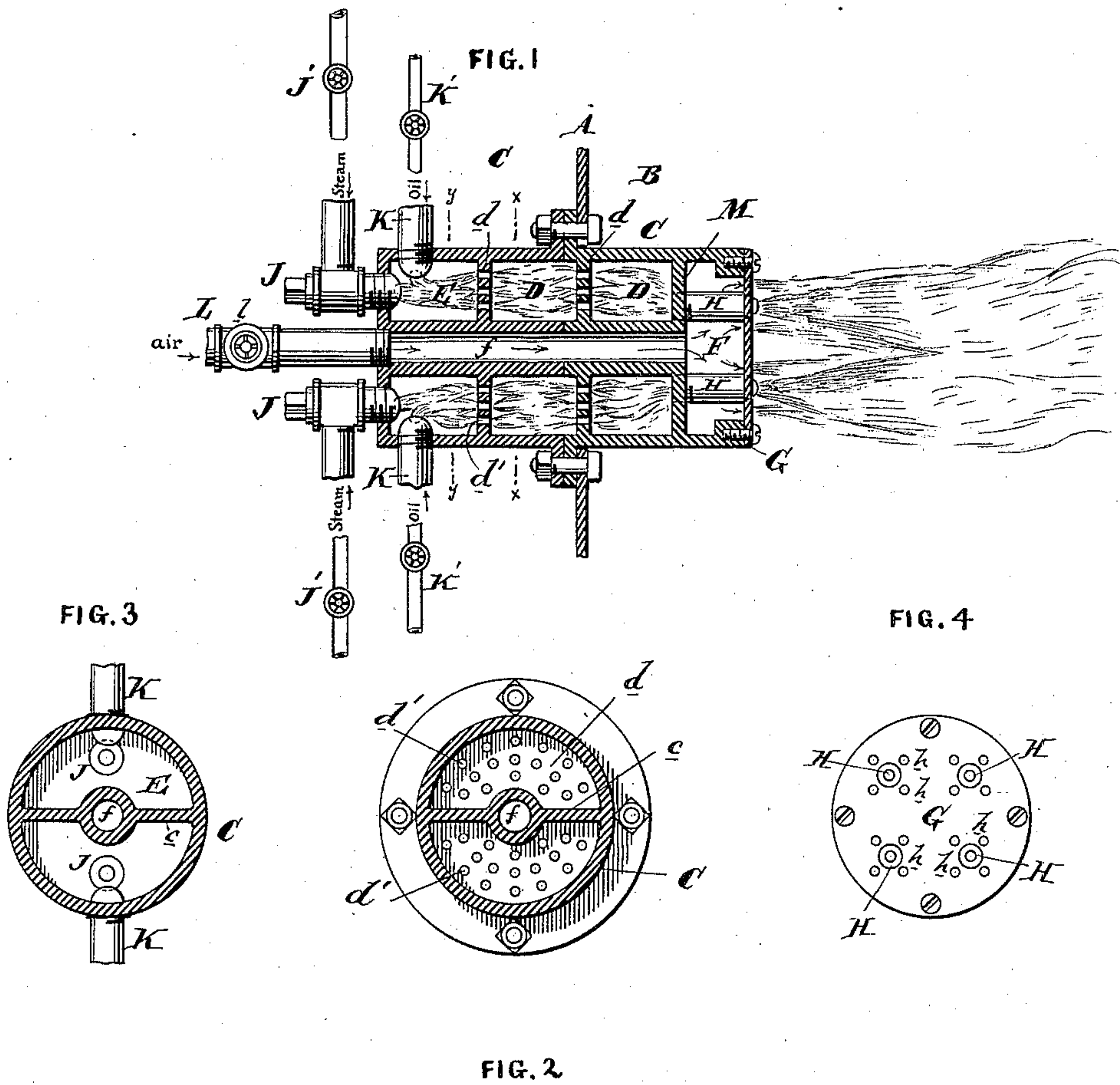
2 Sheets—Sheet 1.

T. R. WHITE.

OIL BURNER.

No. 387,275.

Patented Aug. 7, 1888.



Attest:
Henry Drury
[Signature]

Inventor:
Thomas R. White.
By [Signature]

(No Model.)

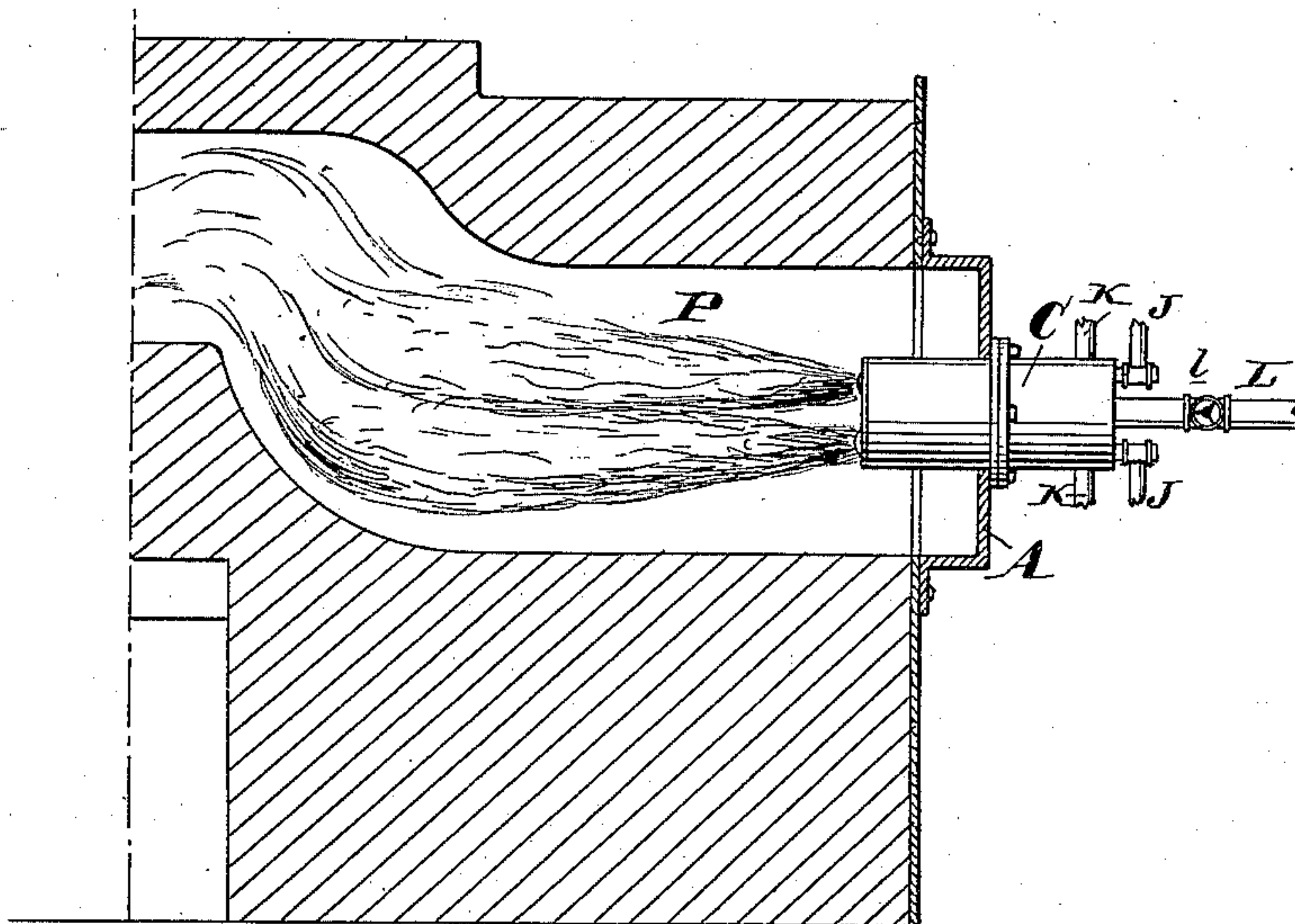
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FIG. 5



Witnesses:

Henry Drury,
Must forward him.

Inventor:

Thomas R. White
By *his attorney*
Must forward him

UNITED STATES PATENT OFFICE.

THOMAS R. WHITE, OF PHILADELPHIA, PENNSYLVANIA.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 387,275, dated August 7, 1888.

Application filed March 3, 1888. Serial No. 266,096. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. WHITE, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improve-
5 ment in Oil-Burners, of which the following is a specification.

My invention relates to oil-burners in general; and it consists of certain improvements which are fully set forth in the following
10 specification, and shown in the accompanying drawings, which form a part thereof.

More particularly my invention relates to that class of oil-burners in which the oil is mixed with steam and thereby blown into the
15 furnace prior to consumption; and the object of my invention is to more intimately and perfectly mix the steam with the oil before it emerges into the furnace and meets with the air, and this I accomplish by the mechanism
20 shown in the drawings, in which—

Figure 1 is a longitudinal sectional view of my mixing-cylinder, showing the mixing of the oil with the steam and air and its introduction into the furnace. Fig. 2 is a cross-
25 sectional view of the same through the line *x x* of Fig. 1. Fig. 3 is a cross-sectional view of the same through the line *y y* of Fig. 1. Fig. 4 is an end elevation of the mixing-cylinder where the oil, steam, and air enter the
30 furnace; and Fig. 5 is a side sectional elevation of a furnace with my burner applied thereto.

In my burner the oil and steam are separated from the air and thoroughly mixed or
35 intermingled by direct contact created by the steam spraying the oil, and then alternately compressing and expanding the vapor so formed by projecting it through small apertures prior to its consumption into flame.

40 The burner may be used for any purpose—such as gas apparatus, furnaces, boilers, &c.—and hence I do not confine myself to any particular use. The air in my burner does not mix with the steam and oil prior to consumption, and even then it is my aim to thoroughly
45 envelop the vapor-jet with a sheath of air which is heated more or less in passing through the air-passages formed by the walls of the mixing-chamber.

50 A is the body or frame of the furnace-retort or other apparatus to be heated, through which the mixing-cylinder C enters. In Fig.

5 is shown an ordinary furnace, P, to which the burner C is applied and through which the flame is caused to pass. This cylinder C is preferably
55 constructed in two parts, as shown, each provided with flanges B, by which these two parts are bolted together and to the frame A; but of course, if desired, the sections or parts of the cylinder C may be made integral. Inter-
60 nally the cylinder C is formed into compartments E, D D, and F, by means of two walls or partitions, *d*, provided with a number of small holes, *d'*, and by the wall or partition M. Through the center of the cylinder passes a
65 pipe or tubular orifice, *f*, for air, from the sides of which extend, preferably horizontally, the partitions *c*, dividing the cylinder C into two sets of compartments, E and D D. These partitions *c* terminate at the wall or
70 partition M, making the compartment F, into which the air-pipe *f* opens, a single compartment commensurate with the inside of the cylinder C. The air in passing through the passage-way *f* and compartment becomes heated. 75

G is a plate fitting to the end of the cylinder, and is bolted to it at *g*, so that when necessary it may be removed and replaced by a new plate.

H are nozzles, preferably four in number, 80 opening from the upper and lower compartments D through the compartment F into the furnace, through which the mixed oil and steam is blown. About the point where these
85 nozzles H open into the furnace are a series of air-blast holes, *h*, opening through the end plate, G, into the compartment F to allow the passage of the air from the pipe *f* into the furnace around the oil and steam from the
90 nozzles H.

J are the steam-pipes through which the steam enters the compartments E, and have valves *J'* to regulate the pressure and amount of steam admitted.

K are the oil-supply pipes entering the compartments E in close proximity to the steam-
95 pipes J, so as to be drawn in by the jets of steam. The supply of oil is controlled by valves *K'*.

L is an air-pipe provided with a valve, *l*,
100 through which air under pressure is admitted to the pipe or passage *f* in the cylinder C.

The nozzles H, I prefer to make screw-threaded, so that when they become injured or worn

by use they may be removed and be replaced by others, to secure greater efficiency; and the pipes K K, J J, and L may for similar reasons and for relative adjustment be likewise constructed.

It will be seen that the oil entering through the nozzles K will be instantly acted upon by the steam from the pipes J, and thoroughly sprayed and mixed with it in the compartments E, and forced through the small holes d' in the first compartment D, which subdivides it and causes more intimate mixture. The mixed steam and oil thus becomes divided into smaller streams and far more intimately mixed, which intermingling is increased by the passage through the second set of holes d' into the second compartment D, where the oil and steam are thoroughly commingled.

It will be noted that the steam and oil as an admixture are caused to pass from one compartment to the next in close juxtaposition, and the pressure created thereby aids very materially in bringing the particles and molecules of the said steam and oil in such close relationship that a thorough mixture is absolutely certain before any air is added, and this mixed vapor is not mixed with air in the furnace in the sense that the oil and steam were mixed, but the air surrounds the steam or jet of combustible vapor of oil and steam, as shown, and causes a rapid combustion, the temperature of which is augmented by the pressure employed. The oil and steam vapor, passing through the nozzles H, enters the furnace, and at the point of entering it is acted upon by the air under pressure from the pipe f , which enters through the holes h simultaneously with the mixture of oil and steam from the nozzles H. These holes h should be arranged so as to surround the nozzle H, as they will then be found more effective.

Any ordinary means may be used to force the air under pressure through the pipe L, and it is evident that hot or cold air blast may be used.

It is evident that, while the mixing-cylinder is here shown formed into similar longitudinal parts by the partitions c , my invention is equally applicable to only one of those parts, or the portion c may be removed, though in practice I prefer to employ both, as my invention is thereby made more effective; but the chief points of my invention are the dividing and mixing of the oil and steam in the compartments D and the blowing of the air through the holes h about the nozzles H, meeting the mixture of steam and oil at place of combustion.

The mere details of construction may be modified without departing from my invention.

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

1. In an oil-burner, the combination of a mixing-cylinder having a series of internally-unobstructed compartments formed by per-

forated dividing-plates between said compartments, oil and steam pipes opening into the first of said compartments for admitting oil and steam and mixing them, and which mixed oil and steam is more intimately mixed by passing through the perforated dividing-plates and caused to pass through the burner without rotary motion, and nozzles opening from the last of said compartments to allow the escape of the mixed steam and oil for combustion, and air-passages around each nozzle to supply air.

2. In an oil-burner, the combination of a mixing-cylinder having a series of compartments formed by perforated dividing-plates between said compartments, oil and steam pipes opening into the first of said compartments for admitting oil and steam and mixing them, and which mixed oil and steam is more intimately mixed by passing through the perforated dividing-plates, nozzles opening from the last of said compartments to allow the escape of the mixed steam and oil for combustion, and an air-blast passage within the cylinder and exterior to the mixing-compartments and terminating in openings surrounding the nozzles for the mixed oil and steam.

3. In an oil-burner, a cylinder having a central air-passage and surrounding mixing-compartments divided by perforated plates or walls, and a blast-chamber at the discharging end of the full diameter of the cylinder, communicating with the air-passage, and having blast-orifices through its end, pipes to admit steam and oil to the first compartment, and a blast-nozzle opening from the last compartment, extending through the blast-chamber, and arranged with its end between the blast-orifices, whereby the air is sucked through by the force of the central jet of oil and steam.

4. In an oil-burner, the combination of the cylinder having compartments E D D, separated by perforated dividing walls or partitions, and an air-blast compartment, F, at the end, an oil-pipe, K, and steam-pipe J, entering said compartment E at one end and arranged to spray the oil by a jet of steam, nozzles H, extending from the compartment D through the compartment F for the passage of the oil and steam vapor, and very small orifices h from the compartment F and close to and surrounding the nozzles H for air-supply to the flame.

5. In an oil-burner, the combination of the cylinder having compartments E D D, separated by perforated dividing walls or partitions, and an air-blast compartment, F, at the end, an air-pipe leading through the burner and close to the hot mixing-chamber, so as to heat the air before becoming burned, an oil-pipe, K, and steam-pipe J, entering said compartment E at one end and arranged to spray the oil by a jet of steam, nozzles H, extending from the compartment D through the compartment F for the passage of the oil and steam vapor, and very small orifices h from the compartment F and close to and surrounding the nozzles H for air-supply to the flame.

6. In an oil-burner, a long annular mixing-

chamber divided into separate compartments by transverse perforated walls, pipes to admit steam and oil to the first of said compartments, long removable nozzles opening out from the last of said compartments, a central blast-passage through the mixing-chamber having an enlarged end forming a chamber surrounding the nozzles, and openings for air from said last-mentioned air-chamber around and close to the orifices of the nozzles.

7. In an oil-burner, a mixing-cylinder having two or more mixing-compartments separated by perforated plates or walls and in which oil and steam are mixed, having a passage for air under pressure through its center and opening into a compartment, F, at the end of the cylinder formed by the wall M, in combination with tubular nozzles for oil-vapor opening through the wall M and extending through but closed to the compartment F, a series of perforations in the end of the cylinder about the nozzles opening from the compartment F, oil and steam pipes entering said mixing-chamber, and an air-blast pipe entering said air-passage.

8. In an oil-burner, a mixing-cylinder for the mixture of oil and steam, divided into two longitudinal compartments by a horizontal wall, c, and into a series of smaller compartments within said longitudinal compartments by vertical perforated walls d, and having a compartment, F, at its end unconnected with said upper and lower compartments, and also having a passage-way, f, passing through it and opening into said compartment F, but unconnected with said other compartments, in combination with steam and oil pipes entering in close proximity the first of the mixing-compartments, and vapor-nozzles opening out of the last of the mixing-compartments, and blast-orifices from the blast-compartment F in close juxtaposition to the vapor-nozzles.

In testimony of which invention I hereunto set my hand.

THOMAS R. WHITE.

Witnesses:

HENRY DRURY,

BUTLER KENNER HARDING.