

No. 614,194.

Patented Nov. 15, 1898.

D. C. WILGUS.
OIL BURNER.

(Application filed June 17, 1898.)

(No Model.)

Fig. 1.

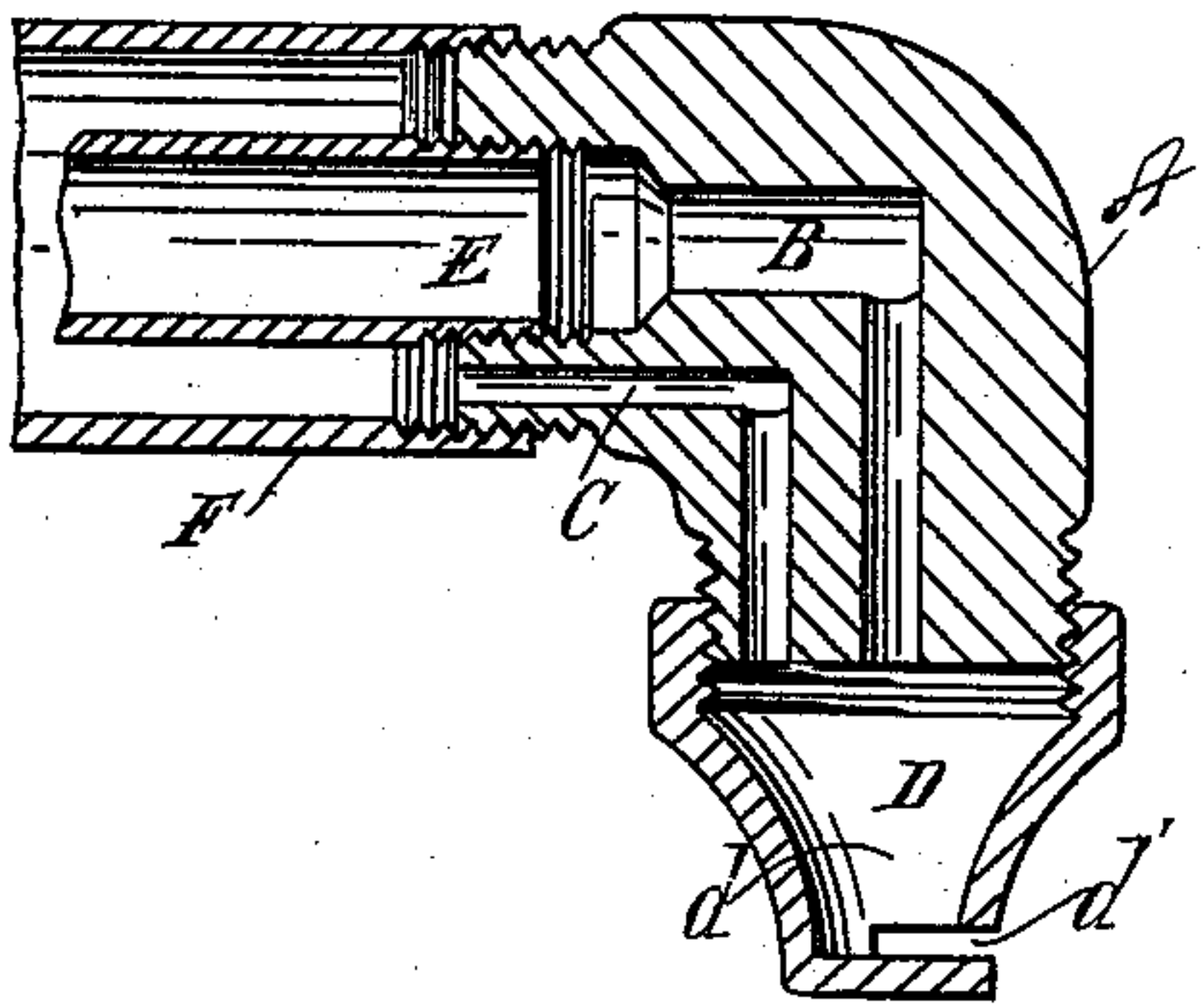


Fig. 2.

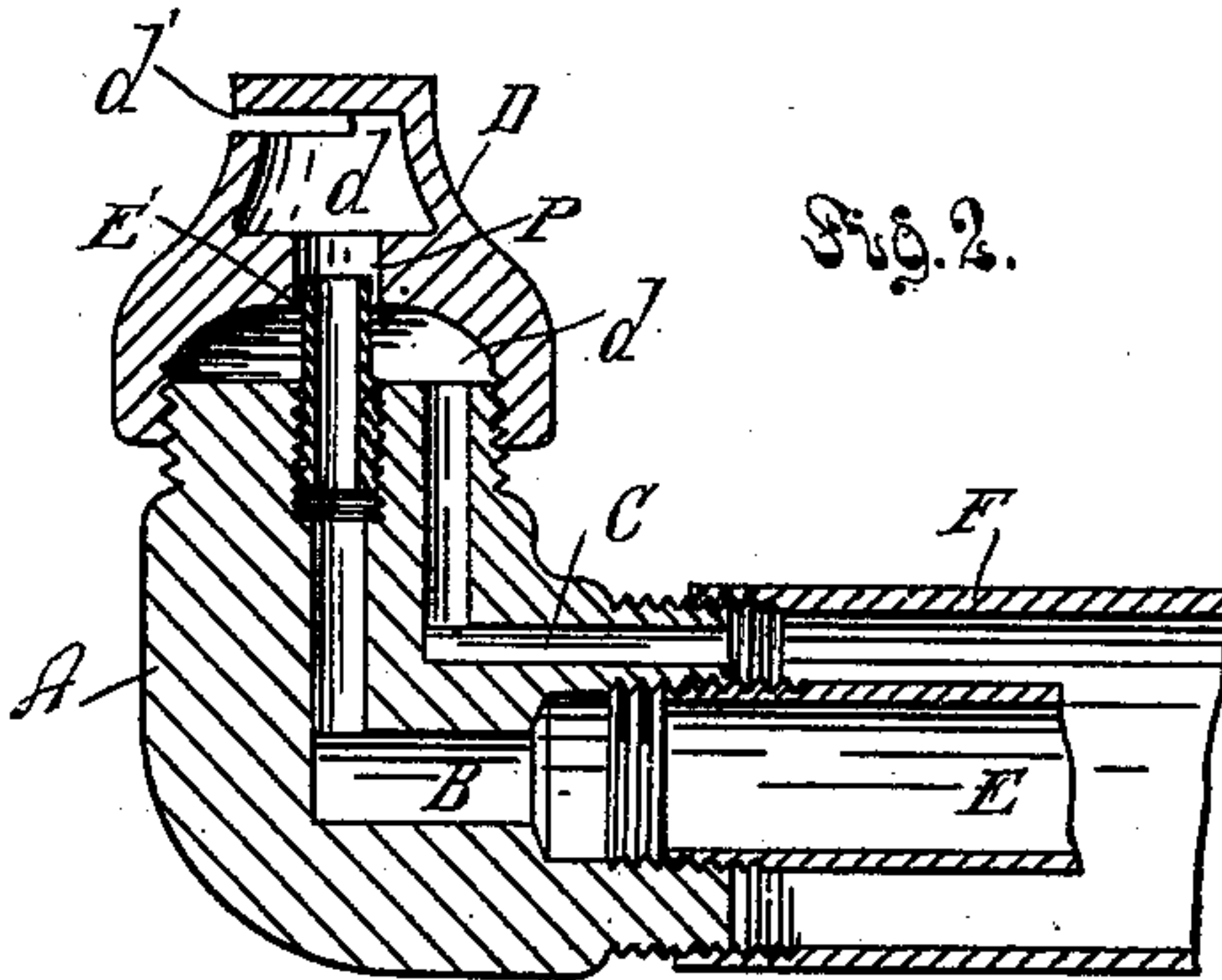


Fig. 3.

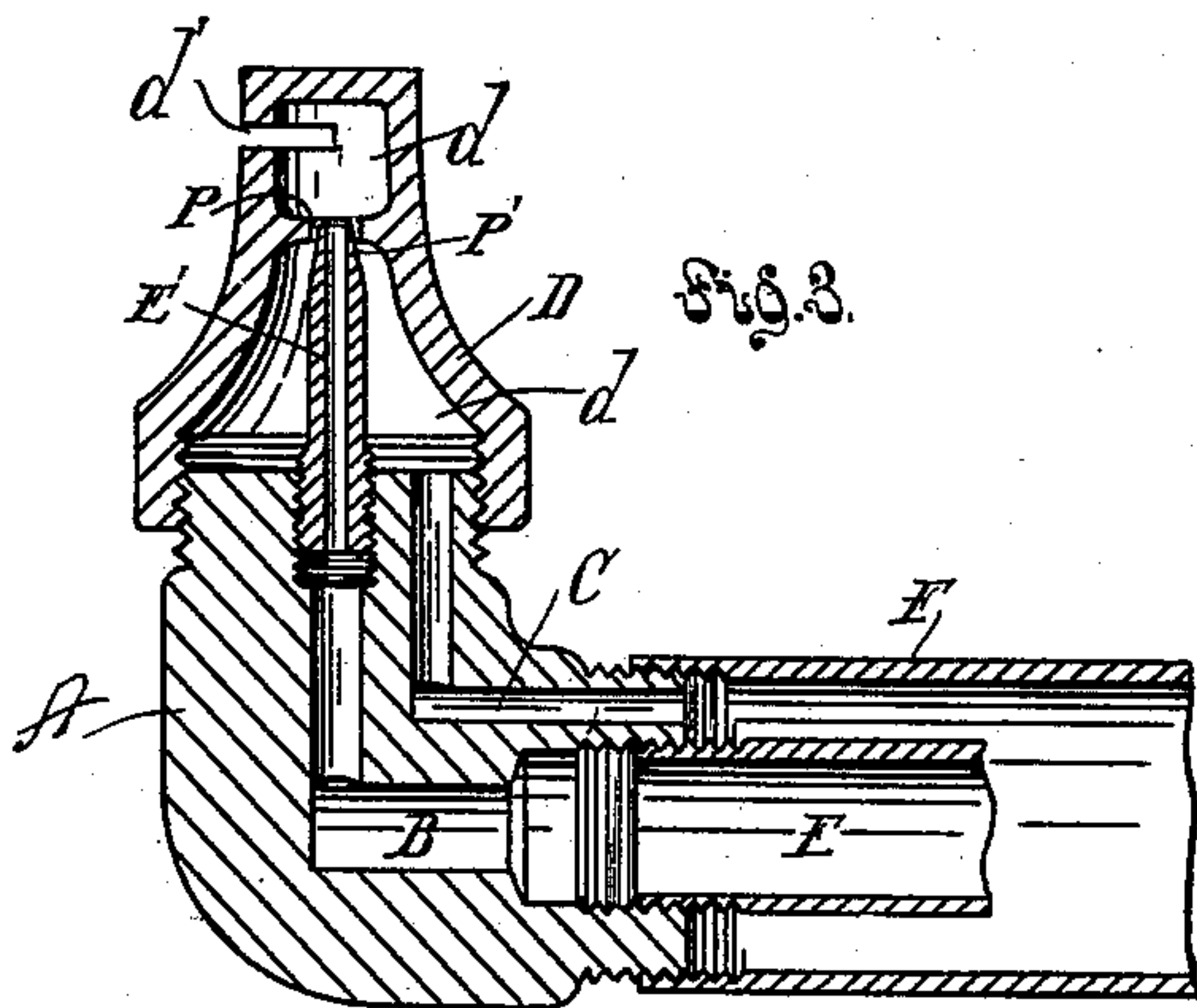
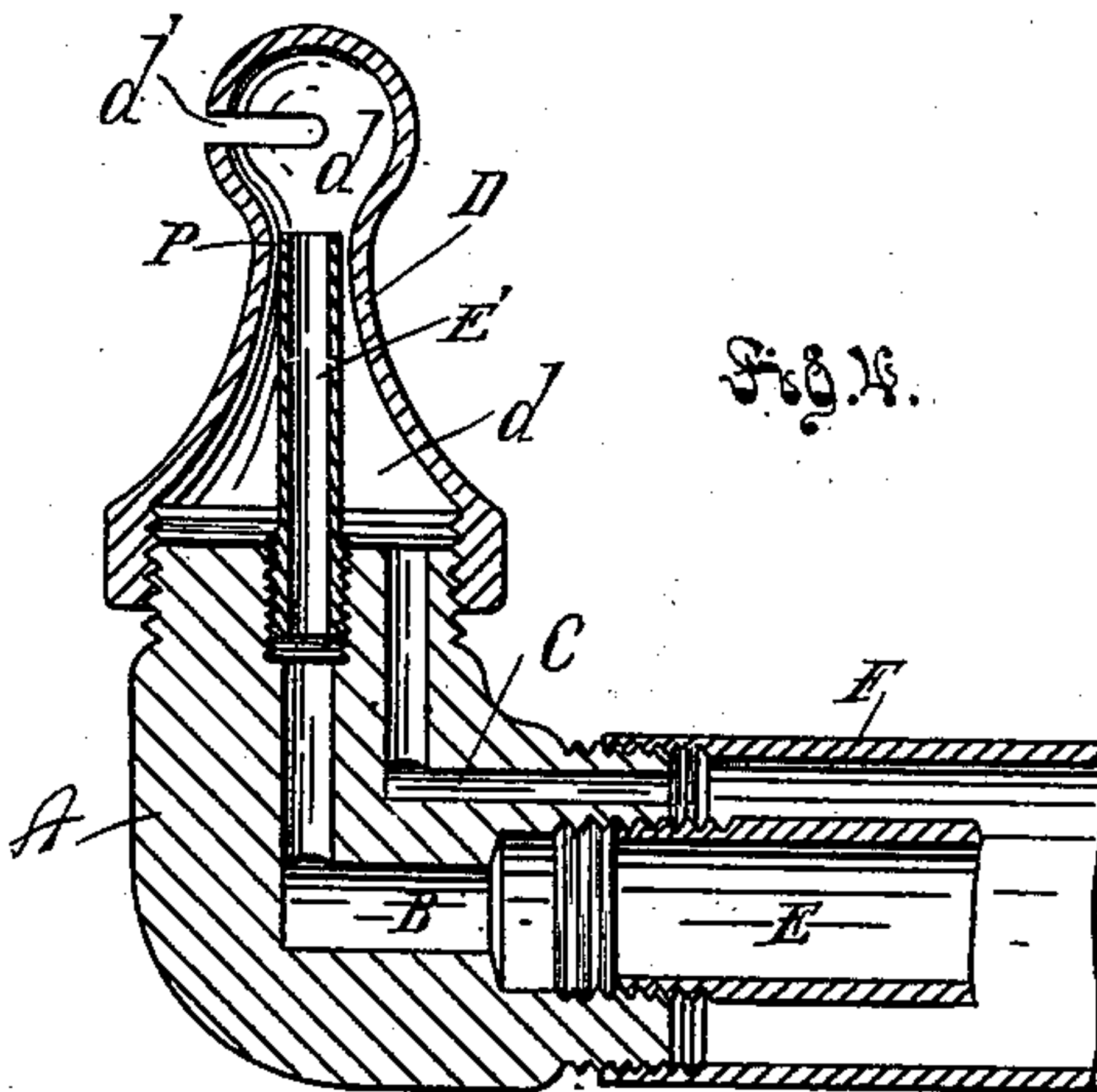


Fig. 4.



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UNITED STATES PATENT OFFICE.

DANIEL C. WILGUS, OF LOS ANGELES, CALIFORNIA.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 614,194, dated November 15, 1898.

Application filed June 17, 1898. Serial No. 683,716. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. WILGUS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Oil-Burners, of which the following is a specification.

My invention relates particularly to burners designed for the use of heavy petroleum-oils, being adapted for burning to the best advantage those oils having an asphaltic base and which are likely to clog the burners in use.

In experimenting with oil-burners I have found that the most effective way in which to utilize heavy hydrocarbon oil is to atomize the oil thoroughly by a jet of steam and to discharge it into the fire-box, where, if the amount of oil and of steam is perfectly regulated, perfect combustion takes place, freeing practically all of the heat-units in the fuel.

One great difficulty with oil-burners arises from the fact that the flame is not of the same intensity throughout, and therefore a portion of the fire-box and flues is subjected to a very fierce heat, another portion will receive a heat of proper degree, while still another portion may be insufficiently heated. This inequality is highly destructive to boilers. In Patent No. 443,808, dated December 30, 1890, I show a burner in which I interpose a shield in front of the issuing steam jet and against which it strikes and is deflected outward at practically right angles to its former line of travel. This causes the sheet of steam to assume a fan shape, the width of which is controlled by the walls of the slot, but the intensity of which is substantially the same from one side to the other. In this burner I also provide radial oil-passages, so that the oil is delivered uniformly across the entire sheet of steam, so that I produce an absolutely even fire within the fire-box, and therefore avoid the objections mentioned as being attendant upon a flame of unequal intensity. I have also demonstrated by practical experiments that unless a bridge-wall is used a uniform spread of flame cannot be produced with straight-shot burners, since in such cases the spread of the steam jet is produced by its expansion and friction against the air, so that the flame will be very intense at the center and very thin and weak at the edges; or if sufficient oil is turned on to pro-

duce a strong flame at the edges the combustion will be imperfect at the center of the flame.

A further objection to be overcome in other oil-burners is that the flame is produced so far from the burner as to require a very long fire-box in order to secure even moderately good results. By my construction the flame is produced within an inch or an inch and a half of the burner-tip, and the length of the flame at its center is practically no greater than at its side edges. This enables me to use my burner in a short fire-box and to apply the heat to the farthest corners with practically the same intensity as to the center of the fire-box, thereby avoiding unequal expansion and contraction, which soon destroys a boiler.

The former burner of mine is particularly effective; but I feed the oil upon a sheet of steam as it issues from the burner, so that the intermixing and atomizing of the oil is produced exterior the burner. This burner has gone into extensive use in California and in those localities where it has been introduced, since a flame of greater breadth and intensity can be produced by it than any burner of which I am aware. It is, however, expensive to manufacture, and I have been endeavoring for many years to produce a burner which will be more economical of manufacture and nearly or quite as satisfactory in use. I found that by mixing the oil and steam previous to discharging them from the burner the construction was greatly simplified; but it became necessary to provide sufficient oil-pressure to overcome the back pressure generated by the steam escaping through the restricted outlet at the mouth of the mixing-chamber—that is to say, in this construction, as in my former construction, it is essential in order to secure a fan-shaped sheet of flame of regular intensity throughout that the discharge-slot through which the jet issues should be arranged practically at right angles to the line of discharge of the steam-inlet into the burner. This abrupt change of direction causes a back pressure in the chamber, which forces the oil back, and thus extinguishes the fire unless sufficient pressure is placed upon the oil to overcome this tendency. This becomes a matter of dif-

difficulty in many instances and has heretofore prevented me from attempting to place this class of burners into use, my efforts being directed to overcoming this objection and producing a burner which will be satisfactory to use with light oil-pressure. During the progress of my experiments along this line I at first produced a burner which was effective in use as long as sufficient oil-pressure was maintained, but which became ineffective under a low oil-pressure. By continued experiments I finally perfected the invention and have produced a device which is not only cheap and simple in construction, but one which may be utilized with as small pressure as the burner shown in my former patent and with nearly, if not quite, as good effect.

My present invention comprises not only the original invention which I made in this respect, but also comprises the various improvements whereby I have since perfected and reduced my former invention to a perfect machine, capable of satisfactory use under any and all conditions ordinarily present.

The particular object of my invention is to provide a burner in which the oil and steam may be mingled before they are discharged from the burner, and a broad fan-shaped sheet of flame of uniform intensity throughout may be produced and all blowpipe action and imperfect combustion heretofore present in such burners may be avoided.

The accompanying drawings illustrate my invention.

Figure 1 is a sectional view of a burner embodying the basic principle of my invention. This burner is only effective where a comparatively heavy oil-pressure can be secured. Fig. 2 is a like view of a burner, showing my invention in one of its perfected forms. Fig. 3 is a like view showing a burner in its perfected form and adapted for adjustment to regulate the flow of steam and, as a result thereof, the flow of oil. Fig. 4 is a like view of a modified form of burner embodying my invention.

In the drawings, A represents a plug, which in practice I make of suitable cast metal, such as brass. B is an oil-passage leading through the plug, and C are steam-passages also leading through the plug. In order to secure the proper position of the burner in the fire-box, I make the plug in the form of an elbow, as shown, and I provide each end of the elbow with screw-threads. Upon one end of the elbow I screw a tip D, which is provided with a tapering chamber d , which is smaller at its outer end than at its inner end, and has its outer end closed and provided with a slot d' , the plane of which is preferably arranged at right angles to the line of discharge of the steam-passages into the chamber. The closed outer end of the chamber forms an impact-face for the steam-jet. This forms a mixing-chamber which is of greater area in cross-section than the cross-sectional area of both the oil and steam inlets, so that expansion

of the mingled steam and oil is permitted before they discharge through the slot.

E is an oil-pipe which screws into one end of the oil-passage, and F is a steam-pipe which screws upon one end of the elbow and incloses the oil-pipe therein. This, as in my former patent, forms a steam-chamber, which surrounds the oil-pipe and heats the oil so as to cause it to flow readily.

As shown in Figs. 2, 3, and 4, the outer end of the oil-passage is screw-threaded, and an oil tube or nozzle E' is adapted to screw into such end, as shown in Figs. 2, 3, and 4. The chamber d is restricted between its ends and the oil-tube leads into this restricted portion of the chamber, so as to leave a small annular passage P surrounding the oil-tube. In Fig. 3 the oil-tube is shown tapered at its outer end P', so that by screwing it in or out the size of the annular opening may be regulated so as to allow a greater or less amount of steam to escape therethrough. In Fig. 4 the outer end of the chamber d is shown substantially round in shape.

In practical operation with the device shown in Fig. 1 oil is turned into the oil-pipe and steam is turned into the steam-pipe. The steam rushing through the steam-passages discharges into the chamber d and carries the oil against the impact-face at the outer end of the chamber, thoroughly atomizing and mingling the oil and steam and breaking up any asphaltic lumps which may be in the oil, after which it escapes from the chamber through the slot d' . This change of direction, as I have hereinbefore described, causes the jet discharged to be fan-shaped and to spread evenly over a greater area than is possible where the slot is substantially in line with the axis of the steam-inlet.

In the form shown in Figs. 2, 3, and 4 the steam rushing through the small annular passage surrounding the oil-pipe creates a vacuum which draws the oil into the chamber, where it is caught by the escaping jet of steam, thoroughly mixed therewith, and discharged, as before explained. By this construction I avoid back pressure, and can use the burner with a very low oil-pressure.

As shown in Fig. 3, by screwing the oil-tube in and out of its seat the burner can be regulated to suit the exigencies of the case. It is to be understood that mixing the steam and oil together in a separate chamber before introducing them into the discharge-chamber will not avoid my claims, which broadly cover an impact-face arranged in front of the mingled oil and steam to cause the jet to issue from the burner at substantially a right angle with its immediate former line of travel.

The burner may be arranged with the tip below, as shown in Fig. 1, or on top, as shown in Figs. 2, 3, and 4.

With my burner I am enabled to produce a flame of uniform intensity throughout the fire-box, reaching into the farthest corners and without the use of bridge-walls or other

brickwork. This cannot be done with straight-shot burners, it being necessary in them to direct the flame against the wall or brickwork in order to cause it to be broken up and to spread evenly throughout the fire-box. This enables me to accomplish superior results with my burner in a furnace which has a fire-box much shorter than any fire-box in which a straight-shot burner can be effectively employed and in addition avoids the expense of bridge-walls, &c.

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

15 1. An oil-burner provided at its tip with a chamber larger in cross-section than the combined cross-sectional area of the oil and steam inlets and provided in one side with a discharge-slot arranged at right angles with the
20 line of travel of the mingled steam and oil entering the chamber.

2. An oil-burner provided with a mixing-chamber having an impact-face arranged directly in the path of the mingled steam and
25 oil, and provided on one side of the chamber with a slot arranged at right angles with the line of travel of the mingled steam and oil discharging against such impact-face.

3. The combination set forth of a chamber
30 having its end closed and having in one side a slot; an oil-inlet into such chamber, and a steam-inlet into such chamber, the line of discharge of the steam being arranged at substantially a right angle with the plane of the slot.

35 4. In an oil-burner, the combination set forth of a chamber having an impact-face; a discharge-slot leading from said chamber and arranged substantially parallel with the impact-face; an oil-inlet into the chamber; and
40 a steam-inlet arranged to discharge steam into the chamber at substantially a right angle with the impact-face.

5. In an oil-burner, the combination set forth of a chamber contracted between its ends; a slot leading from the chamber at substantially a right angle to the length of the chamber; an oil-passage leading into the chamber; and a steam-passage leading into the chamber substantially at right angles with the plane of the slot. 45 50

6. In an oil-burner, the combination set forth of a tapering chamber smaller in the middle than at either end; a discharge-slot leading from one end of the chamber; an oil pipe or tube passing through the other portion
55 of the chamber and terminating in a restricted portion of the chamber; and a steam-inlet arranged opening into that end of the chamber which is not provided with the slot.

7. In an oil-burner, the combination set forth of the plug provided with the oil-inlet and the steam-passage leading therethrough; a hollow tip adapted to screw upon one end of the plug and provided with a slot arranged transverse the line of discharge of the steam-
65 inlet; an oil-pipe leading into the oil-passage; and a steam-pipe screwed upon the other end of the plug and arranged to supply steam to the steam-passage.

8. The combination set forth of the plug
70 having a centrally-arranged oil-inlet provided with screw-threads; an oil-tube adapted to screw into such inlet and to project therefrom; a steam-passage leading through the plug; a discharge-tip adapted to screw upon the end
75 of the plug and provided with a chamber having a restricted portion into which the oil-tube projects when the tip is screwed upon the plug, and also provided with a slot arranged transverse the axis of the tube.

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