

No. 743,777.

PATENTED NOV. 10, 1903.

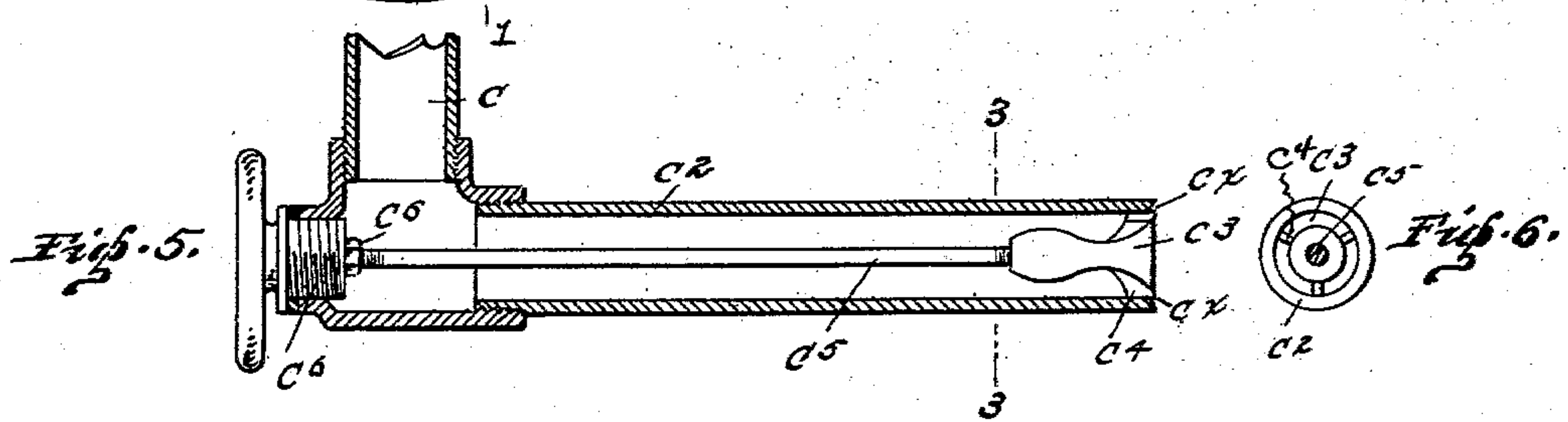
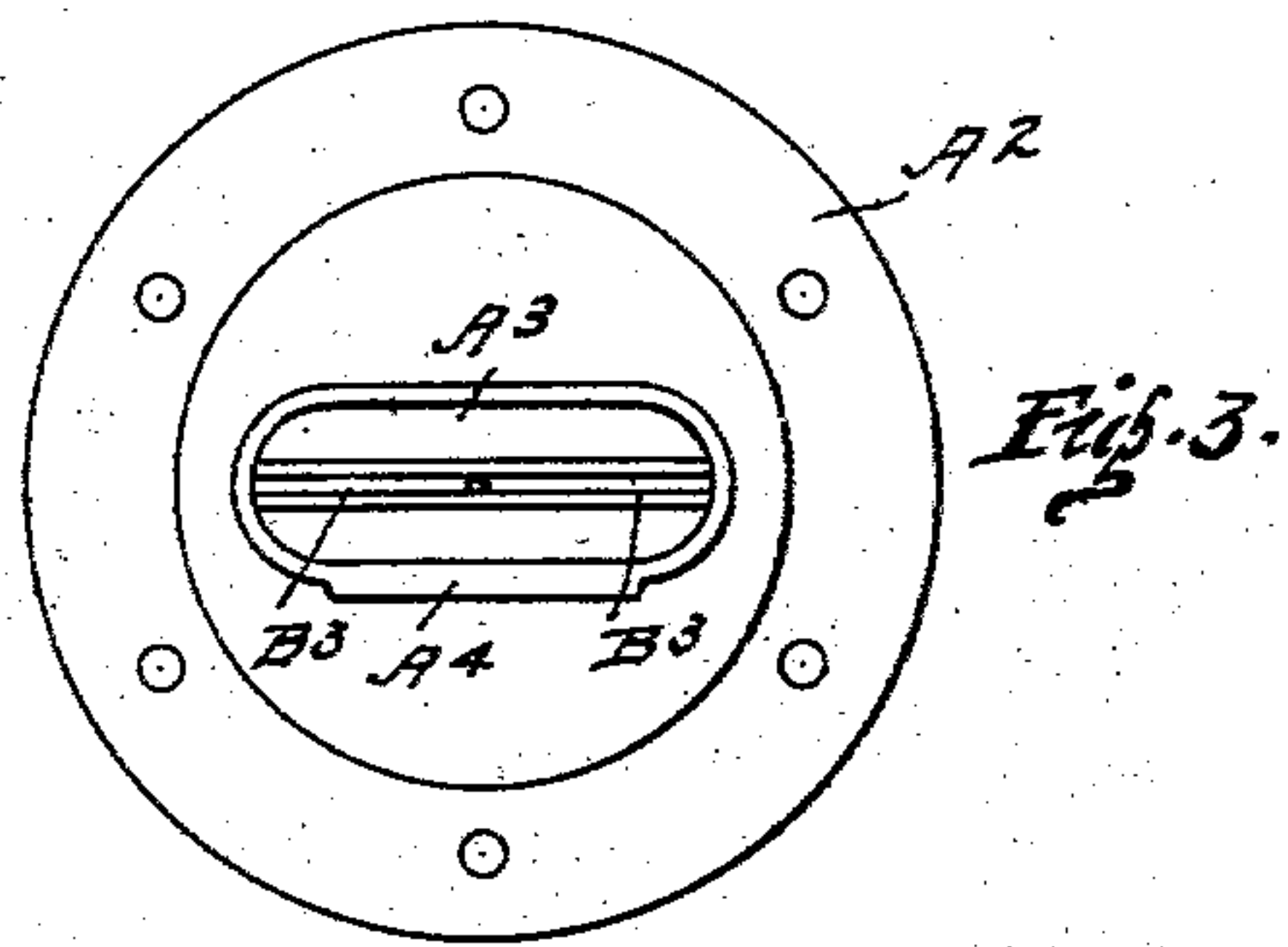
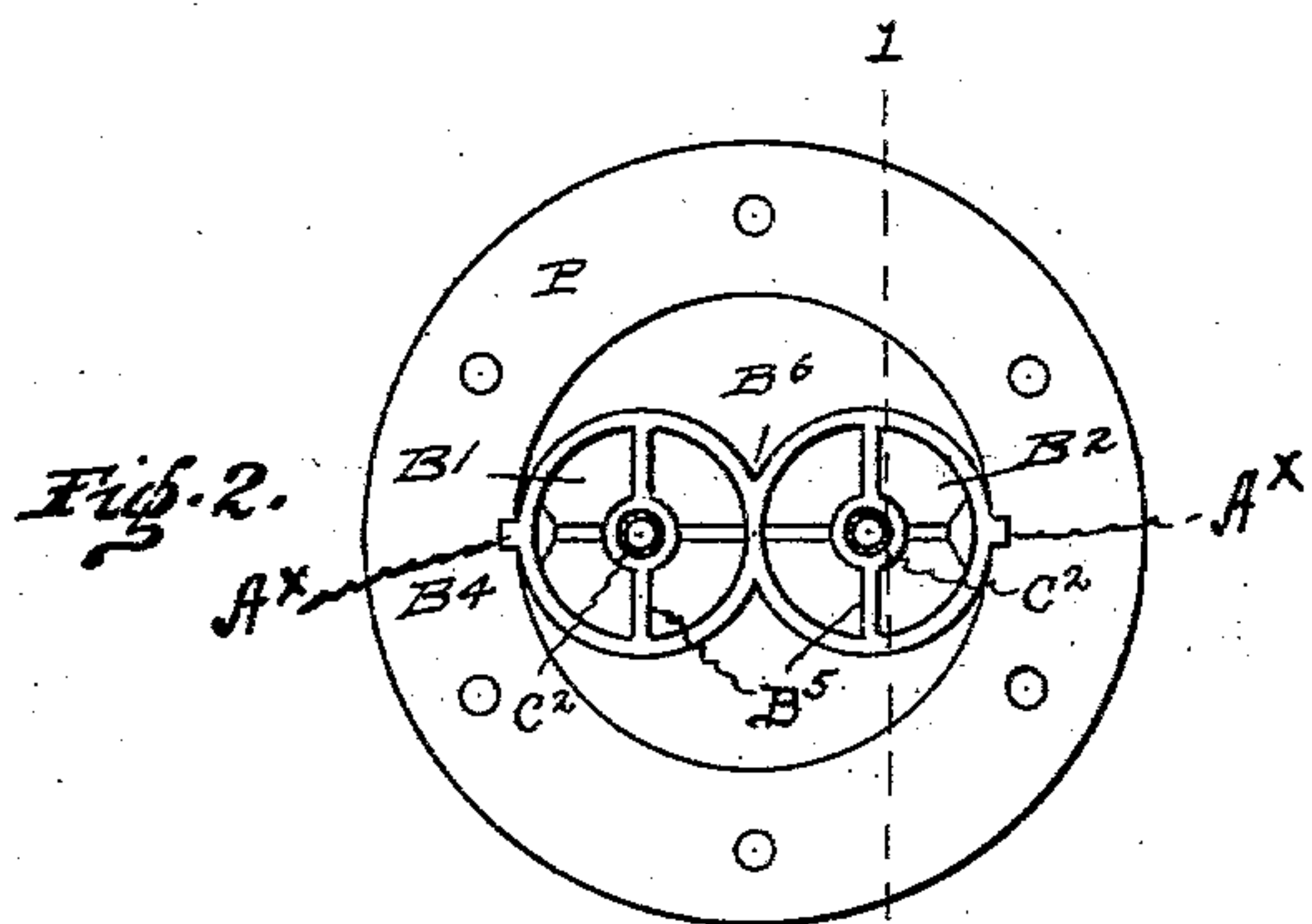
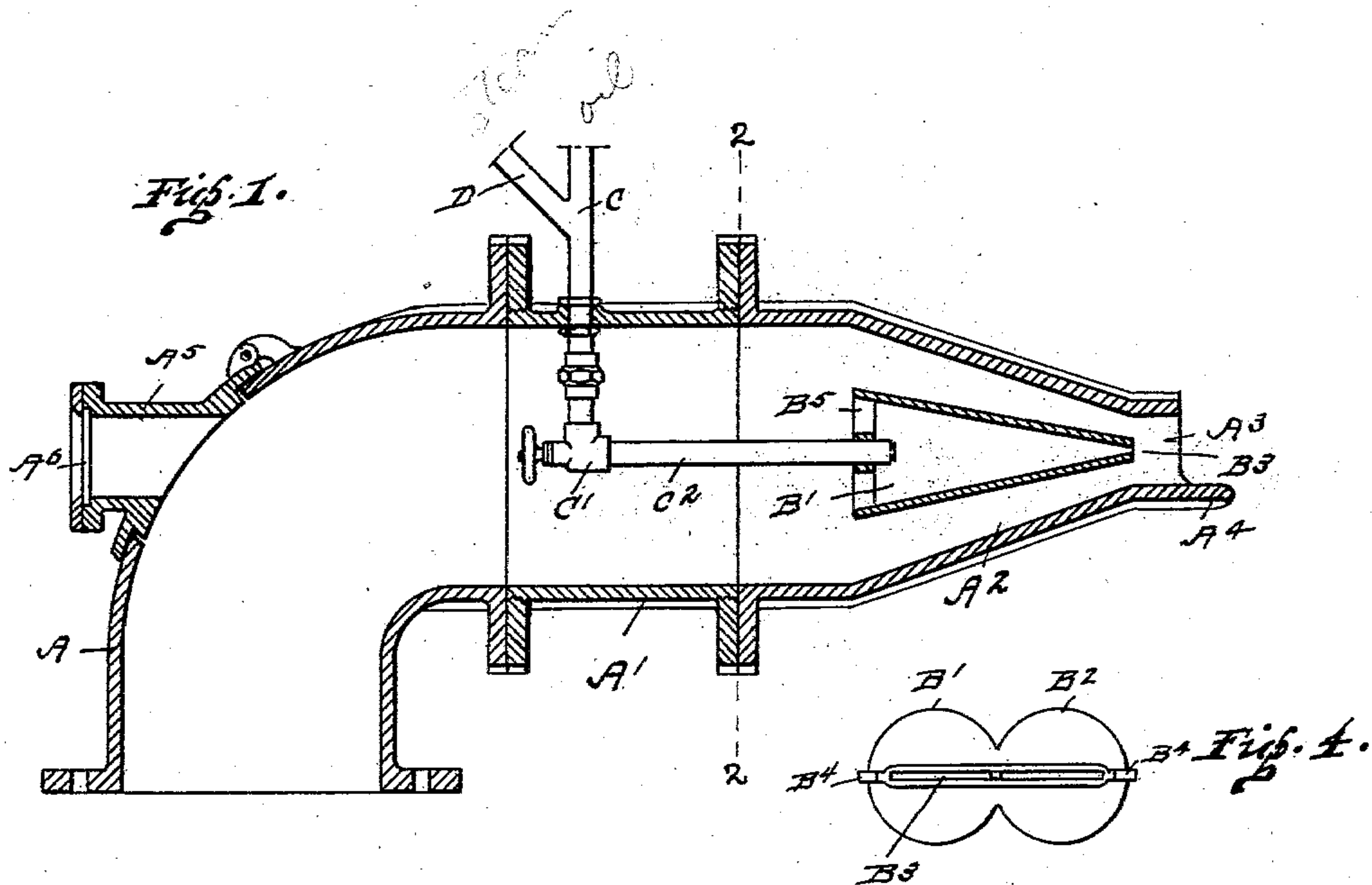
E. W. TUCKER & C. L. GRUNDELL.

CRUDE OIL BURNER.

APPLICATION FILED SEPT. 29, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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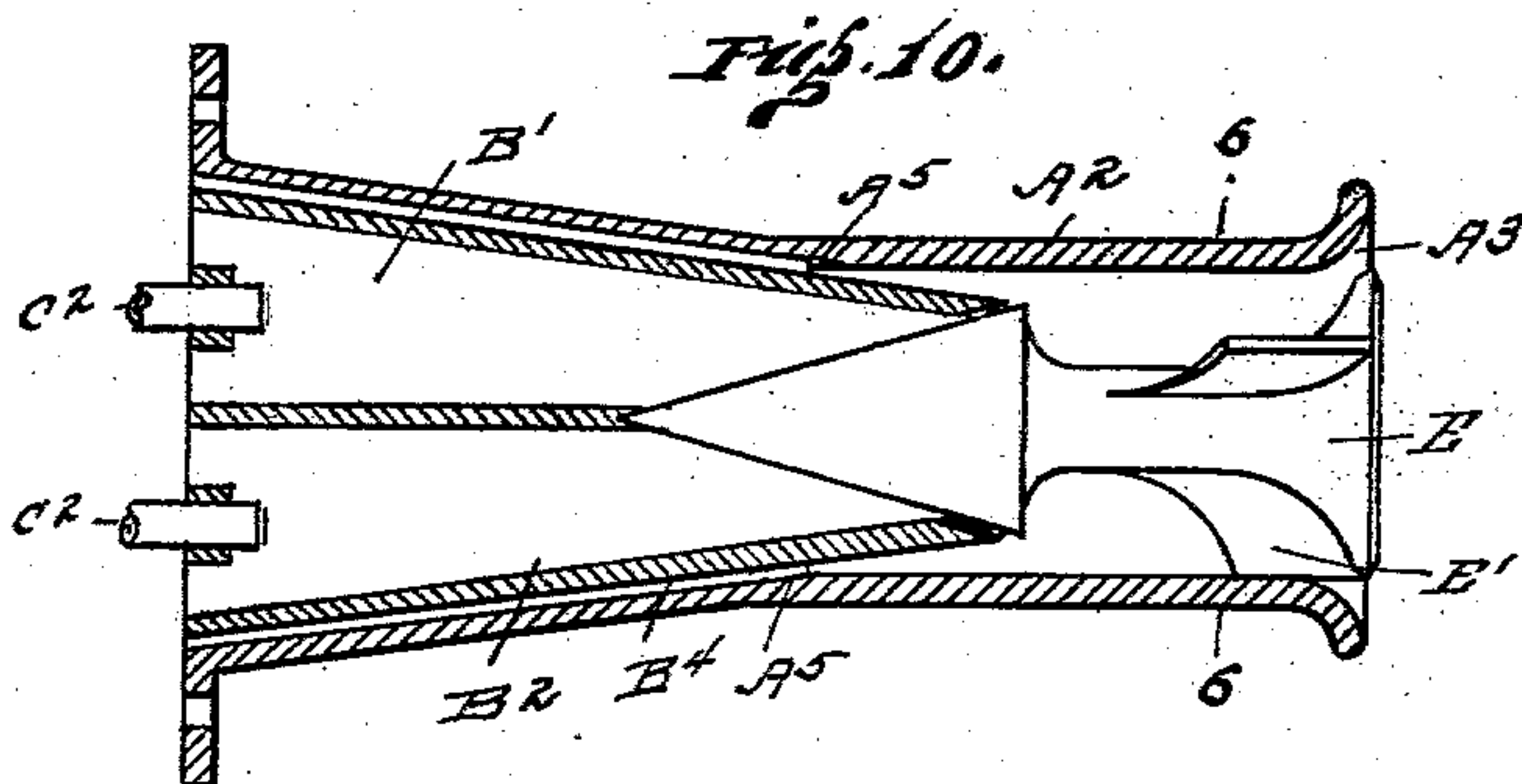
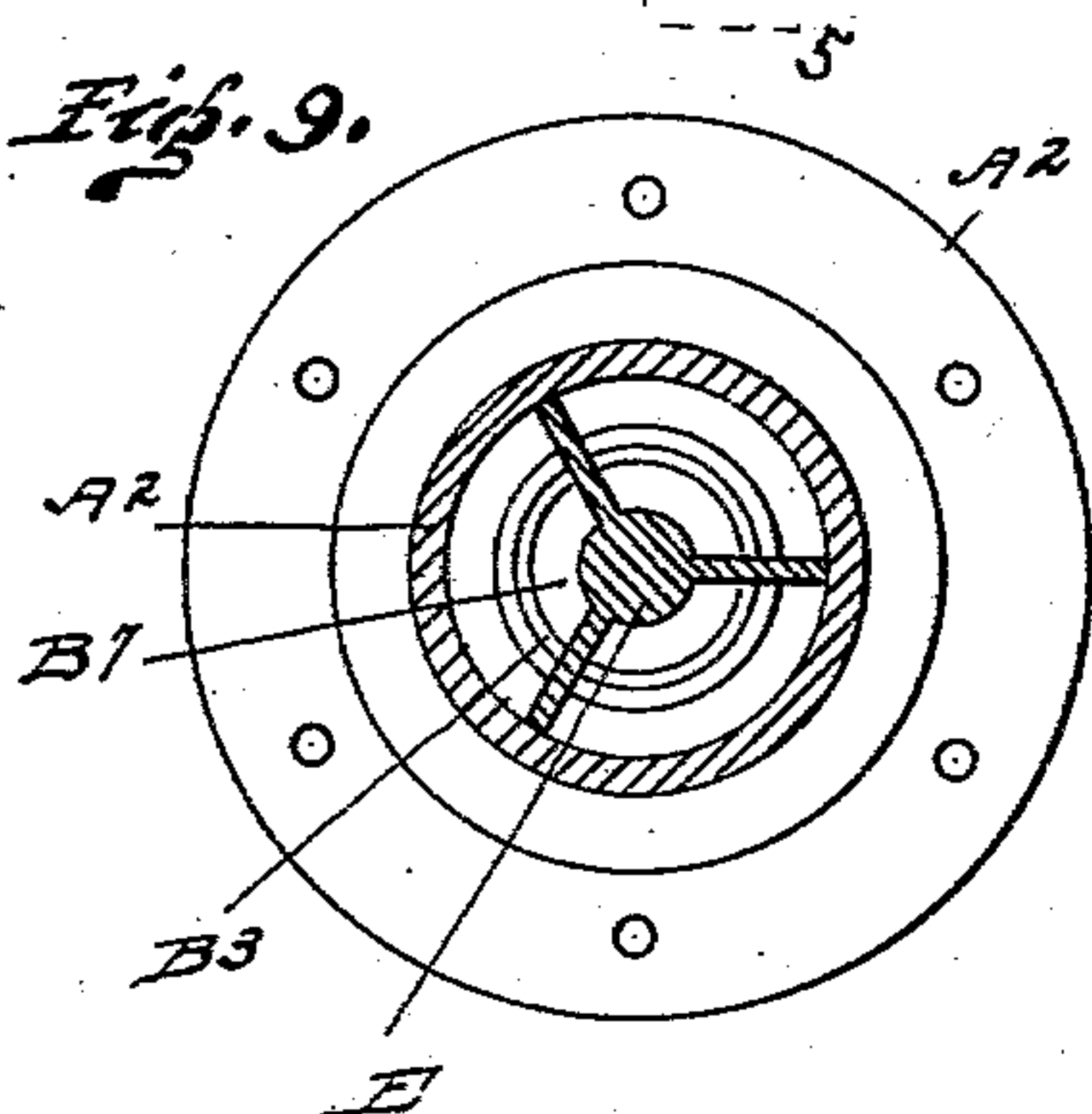
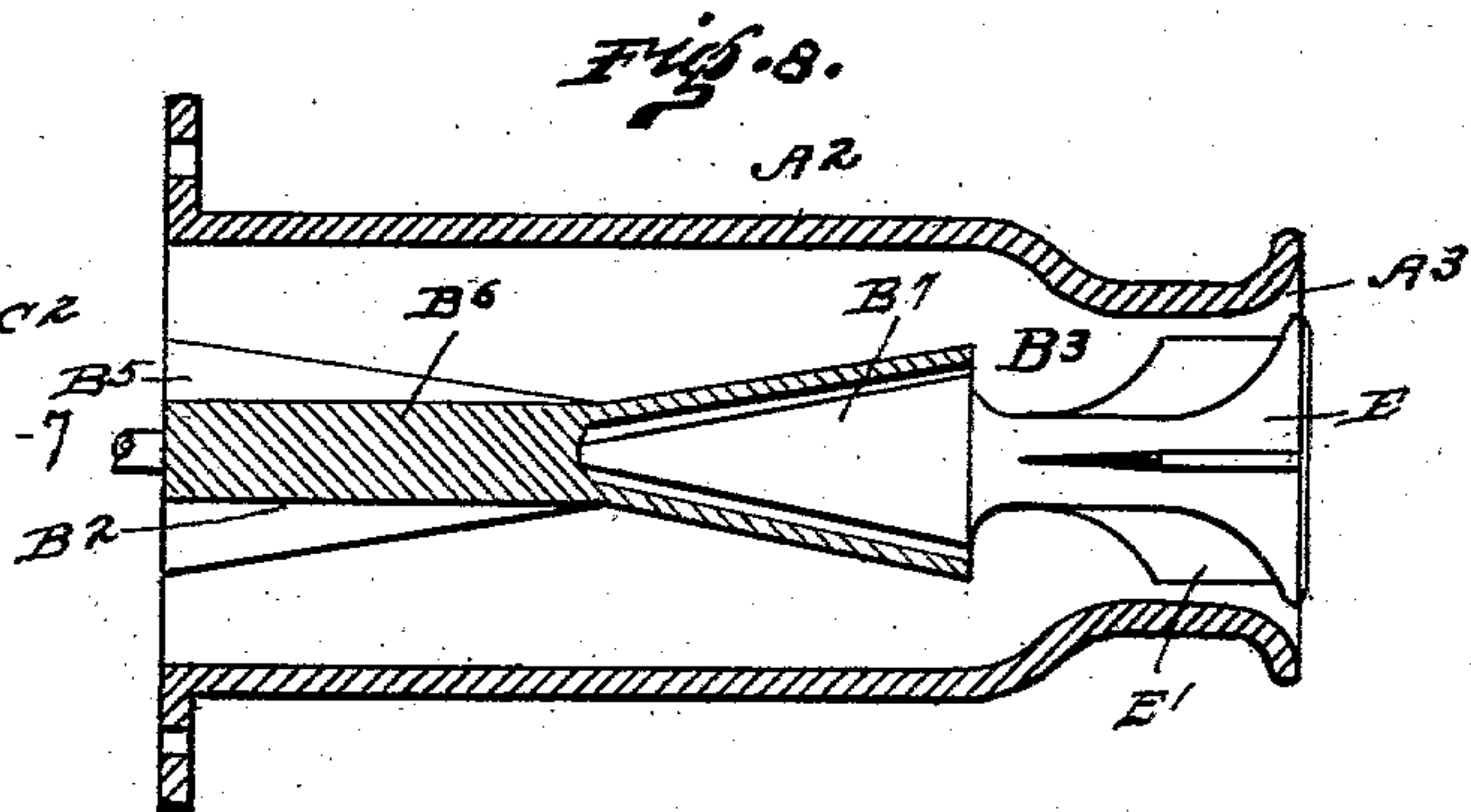
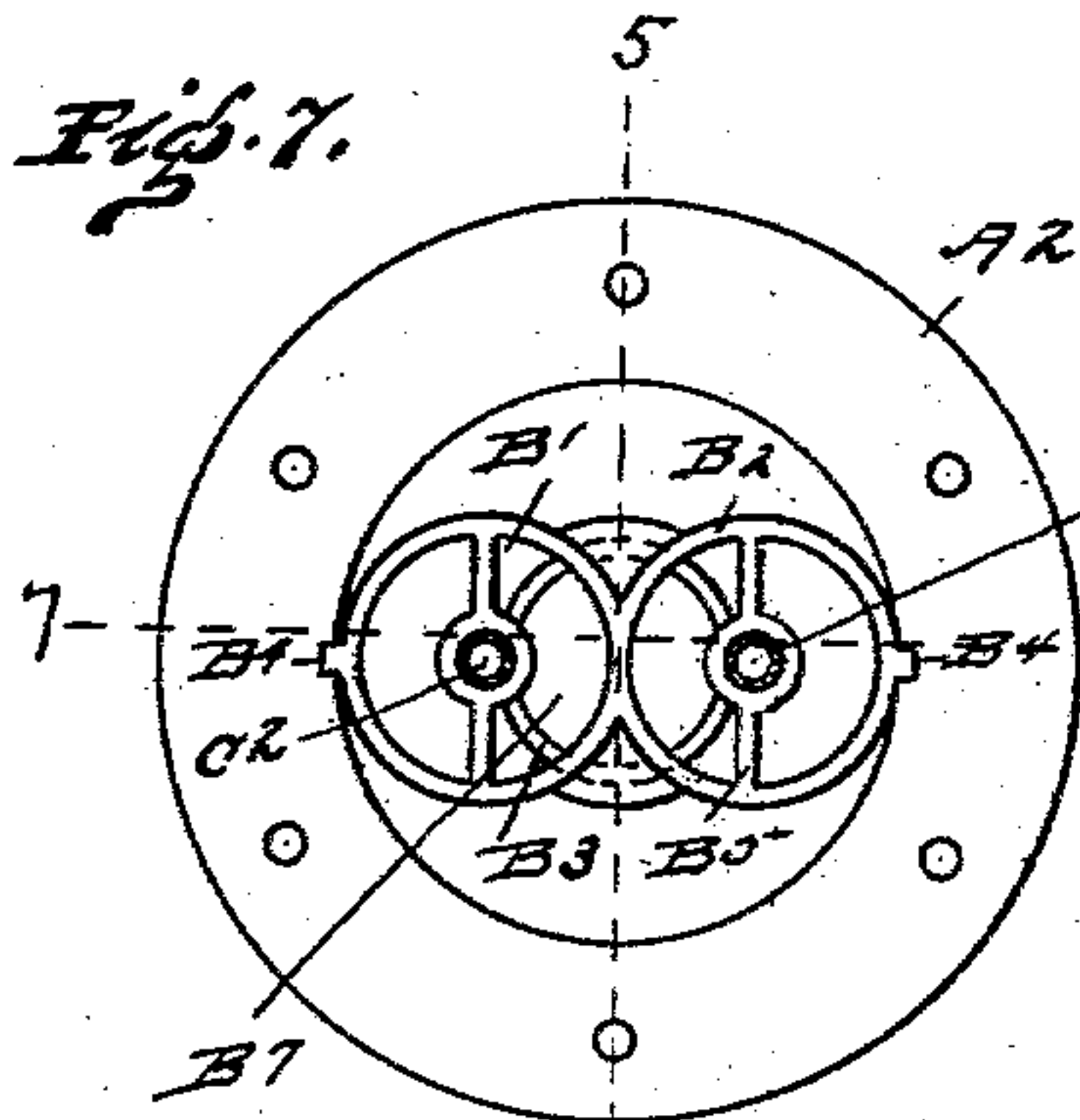
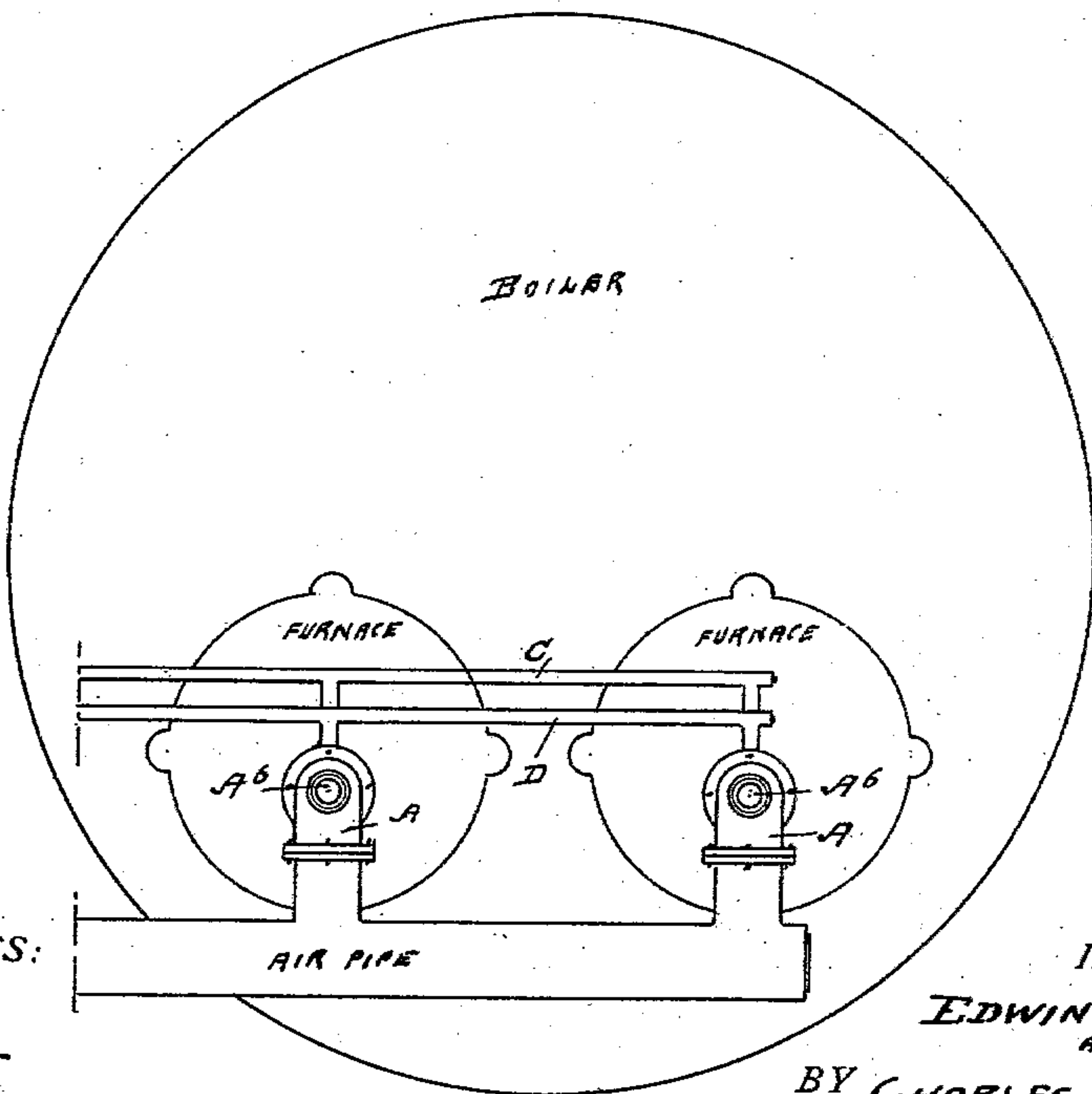


Fig. 11.



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UNITED STATES PATENT OFFICE.

EDWIN W. TUCKER AND CHARLES L. GRUNDELL, OF SAN FRANCISCO,
CALIFORNIA.

CRUDE-OIL BURNER.

SPECIFICATION forming part of Letters Patent No. 743,777, dated November 10, 1903.

Application filed September 29, 1902. Serial No. 126,309. (No model.)

To all whom it may concern:

Be it known that we, EDWIN W. TUCKER, residing at 818 Page street, and CHARLES L. GRUNDELL, residing at 1638 Hyde street, in the city of San Francisco, county of San Francisco, and State of California, citizens of the United States, have invented certain new and useful Improvements in Crude-Oil Burners; and we do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to improvements in crude-oil burners, and particularly to low-pressure oil-burners.

The object sought to be accomplished is to provide a burner capable of complete atomization under an air-pressure of seven ounces and upward, capable of use in connection with a blower or any forced-draft system. In boiler-work all the air admitted to the furnace is compelled to pass through the burner. This feature of the invention will be claimed, as the burner is constructed with this in view.

The invention consists, broadly, of a barrel having a restricted outlet, flat, round, or annular, to suit circumstances, an atomizing-chamber extending back into the barrel from the outlet and consisting of a compound hollow cone focusing at the point of outlet, open at the rear to the air forced through the barrel, and an oil-inlet adapted to spray the oil into the atomizing-chamber in the path of the air-draft, the whole so arranged that a portion of the air admitted will pass through the atomizing-chamber to combine with the oil, the remainder to pass about the atomizing-chamber to the point of outlet to supply the oxygen necessary to a proper combustion within the furnace.

In the accompanying drawings, Figure 1 is a longitudinal sectional view on the line 1 1, Fig. 2, of a burner constructed to throw a flat flame. Fig. 2 is a rear elevation of the same, looking forward from the flange-line 2 2, Fig. 1. Fig. 3 is a front elevation of the same, looking into the muzzle of the burner. Fig. 4 is a front elevation looking into the atomizing-chamber. Fig. 5 is a longitudinal section of the oil-injector. Fig. 6 is a rear ele-

vation in cross-section of the same on line 3 3, looking forward. Fig. 7 is a similar view to Fig. 2 of a burner constructed to throw an annular flame. Fig. 8 is a vertical cross-section of the same on line 5 5. Fig. 9 is a lateral cross-section of the same on the line 6 6, Fig. 10, looking rearward. Fig. 10 is a horizontal sectional view on the line 7 7, Fig. 7. Fig. 11 is a front elevation of a furnace-front having these burners applied in the approved manner.

In detail the construction consists of flanged elbow A, projecting beyond the furnace-front and providing means of connection between the blower and the burner-barrel A', to which is bolted the restricted nozzle A². The nozzle terminates in the muzzle A³, having parallel sides, and the lip A⁴, which gives the flame an upward tendency. By reason of the low pressure and the fact that the whole volume of air admitted to the furnace must pass through the burner the barrel is given an area in excess of the requirements of simple atomization.

The atomizing-chamber consists of a compound hollow cone made up of a casing divided into independent cone-shaped chambers having distinct inlets B' and B², converging to a single restricted outlet B³, adapted to form a flat flame. It is preferably cast in a single piece with the side tongues B⁴ to slide into the grooves A^x in the side of the nozzle A². The outlet of the atomizing-chamber extends into the muzzle of the burner.

The oil-inlet consists of the leads C C, leading into the elbows C', into which the tubes C² are screwed, the nozzles of said tubes extending into the respective inlets of the atomizing-chamber, being centered therein by the webs B⁵. The oil, under pressure of fifteen pounds, more or less, is caused to spray in a thin annular film by the bell-shaped deflecting-head C³, which exactly fills the bore of the tube C², except for the adjustable annular space C^x. The head is provided with the radial webs C⁴ to center same within the tube C². The head is fixed upon the end of the rod C⁵, adjustably screwed into the plug C⁶, screwed into the back of the elbow. This permits a ready withdrawal of the mechanisms in the tube C². The rod C⁵ is capable

of longitudinal adjustment, as evidenced by the lock-nut C⁶. The oil deflected by the head is ejected from the tube in the form of a thin tulip-shaped film, the volume of which
5 is determined by the space C^x.

In connection with very low air-pressure and heavy oils the atomization can be assisted by the introduction of steam into the oil-pipe through the pipe D, set at an angle
10 to the oil column to produce a suction, this principle being well known.

In the production of an annular flame certain changes of form are necessary in the atomizing-chamber and in the muzzle of the
15 burner and in addition the deflecting-head E, similar in operation to the head C³ in the injection of the oil, as described, the general *modus operandi* remaining unaltered. In the annular-flame construction the center dividing-wall B⁶ in the atomizing-chamber at
20 the point of conveyance takes the form of a cone B⁷, transforming the combustible mixture into an annular column, delivering same against the deflecting-head E, having an outward flare equal in diameter to the diameter
25 of the muzzle of the burner, within which it is centered by the radial webs E'.

In operation the burner is supposed to be bricked into the furnace-front or side walls
30 of the furnace from the flange-line 2 2 to the muzzle, from which the bricks fall away to allow for the expansion of the flame, the ash and damper doors being closed to cause all air to pass through the burner into the
35 furnace. The air under forced draft, impelled by blowers or compressors, rushes through the barrel of the burner, the proper proportion passing through the atomizing-chamber, breaking up and carrying forward
40 the oil sprayed therein to the muzzle of the burner, where it is ignited. The balance of the volume of air passes around the atomizing-chamber, escaping through the muzzle to supply the oxygen necessary to proper
45 combustion. By thus supplying the air the flame is protected from all counter-currents in the furnace, enhancing its quality and power.

The opening in the elbow A at the rear, covered by the hinged trap A⁵, provides a means
50 for placing, renewing, or manipulating the atomizing mechanisms without disturbing the rest of the burner. The hollow body at the trap A⁵, covered by the glass A⁶, provides a
55 peep-hole for studying the burner while in operation.

Having thus described this invention, what

we claim, and desire to secure by Letters Patent, is—

1. In a crude-oil burner, the combination of 60
an elbow having a hinged trap with a peep-hole therein in its outer sweep; a barrel forming a continuation of the said elbow and terminating in a restricted muzzle; an atomizing-chamber consisting of a compound cone 65
having two inlets converging to a common outlet in line with the muzzle of the burner; and means for spraying oil into the inlets of the atomizing-chamber in the path of the air forced through the barrel of the burner: substantially as described. 70

2. In a crude-oil burner, the combination of a barrel terminating in a restricted muzzle; an atomizing-chamber consisting of a compound cone having two inlets and converging 75
to a common outlet and slidably fixed within the barrel in line with the said muzzle; and means for spraying oil into the said atomizing-chamber in the path of the air forced through the said barrel: substantially as described. 80

3. In a crude-oil burner, the combination of a barrel, a casing located therein, said casing being divided into independent cone-shaped atomizing-chambers, and means for spraying 85
oil into said chambers, as set forth.

4. In a crude-oil burner, the combination of a barrel, a casing located therein, said casing being divided into independent cone-shaped atomizing-chambers, and spraying devices 90
leading into the rear of each of said chambers, as set forth.

5. In a crude-oil burner, the combination of a barrel, a casing slidably fixed therein, said casing being divided into independent cone-shaped atomizing-chambers, and means for spraying oil into said chambers, as set forth. 95

6. In a crude-oil burner, the combination of a barrel terminating in a restricted muzzle, a casing conforming to the contour of said barrel and located therein, said casing being divided into a plurality of cone-shaped atomizing-chambers having independent inlets and converging to a common outlet, means for spraying oil into said atomizing-chamber, and 100
means for deflecting the flame as it leaves said muzzle, as set forth. 105

In testimony whereof we have hereunto set our hands this 5th day of September, 1902.

EDWIN W. TUCKER.

CHARLES L. GRUNDELL.

Witnesses:

BALDWIN VALE,

A. C. DOYLE.