

No. 608,025.

Patented July 26, 1898.

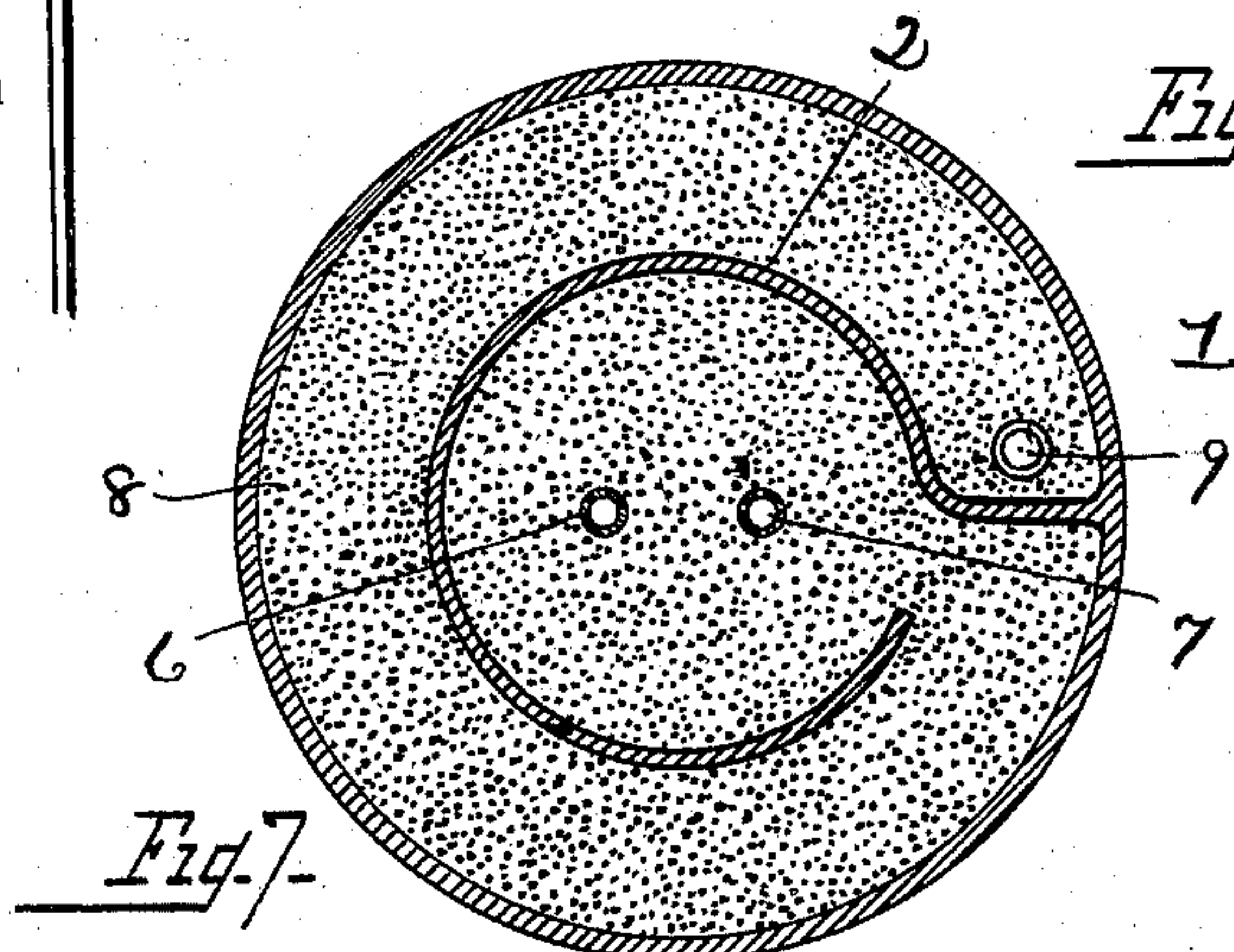
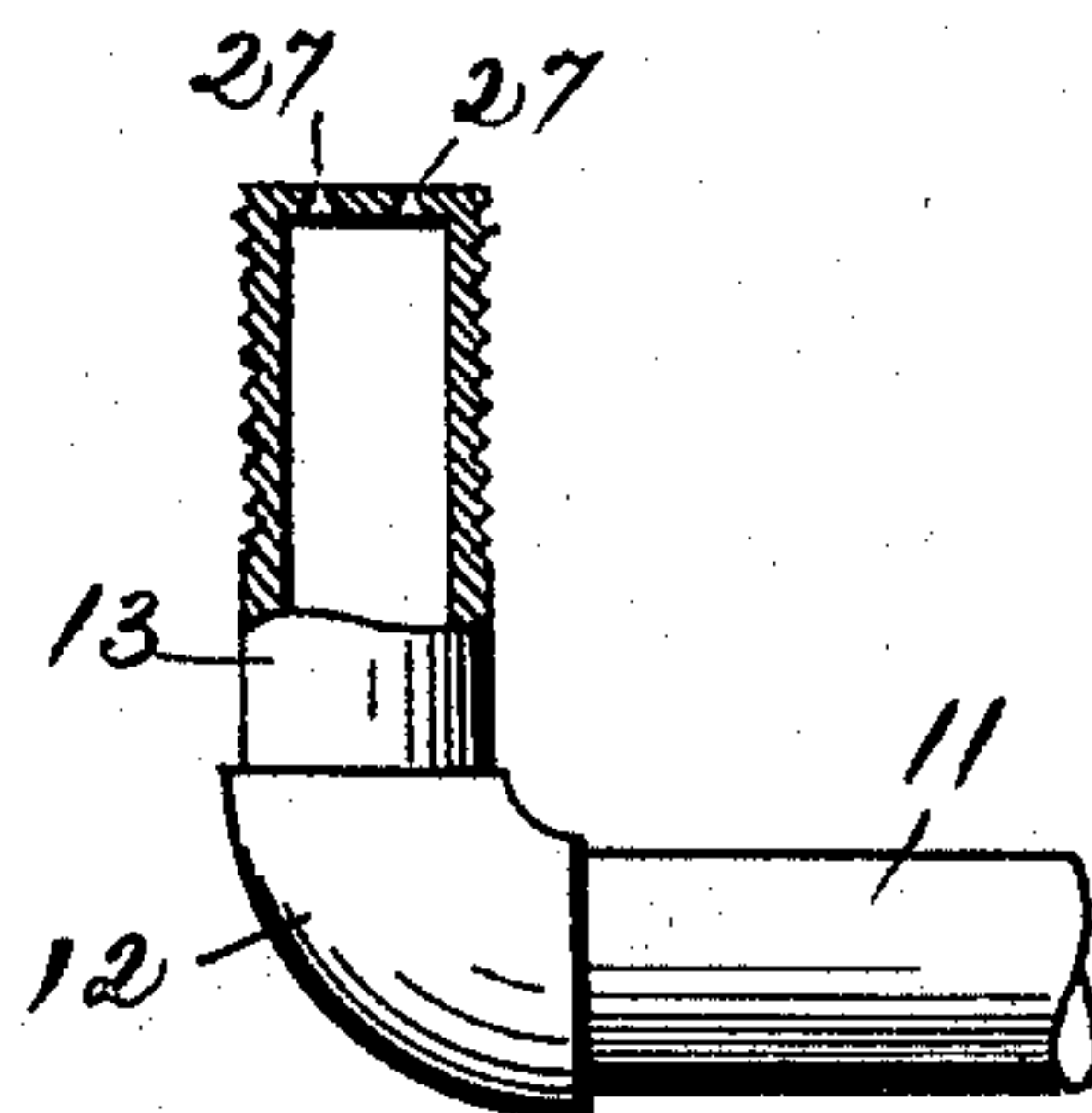
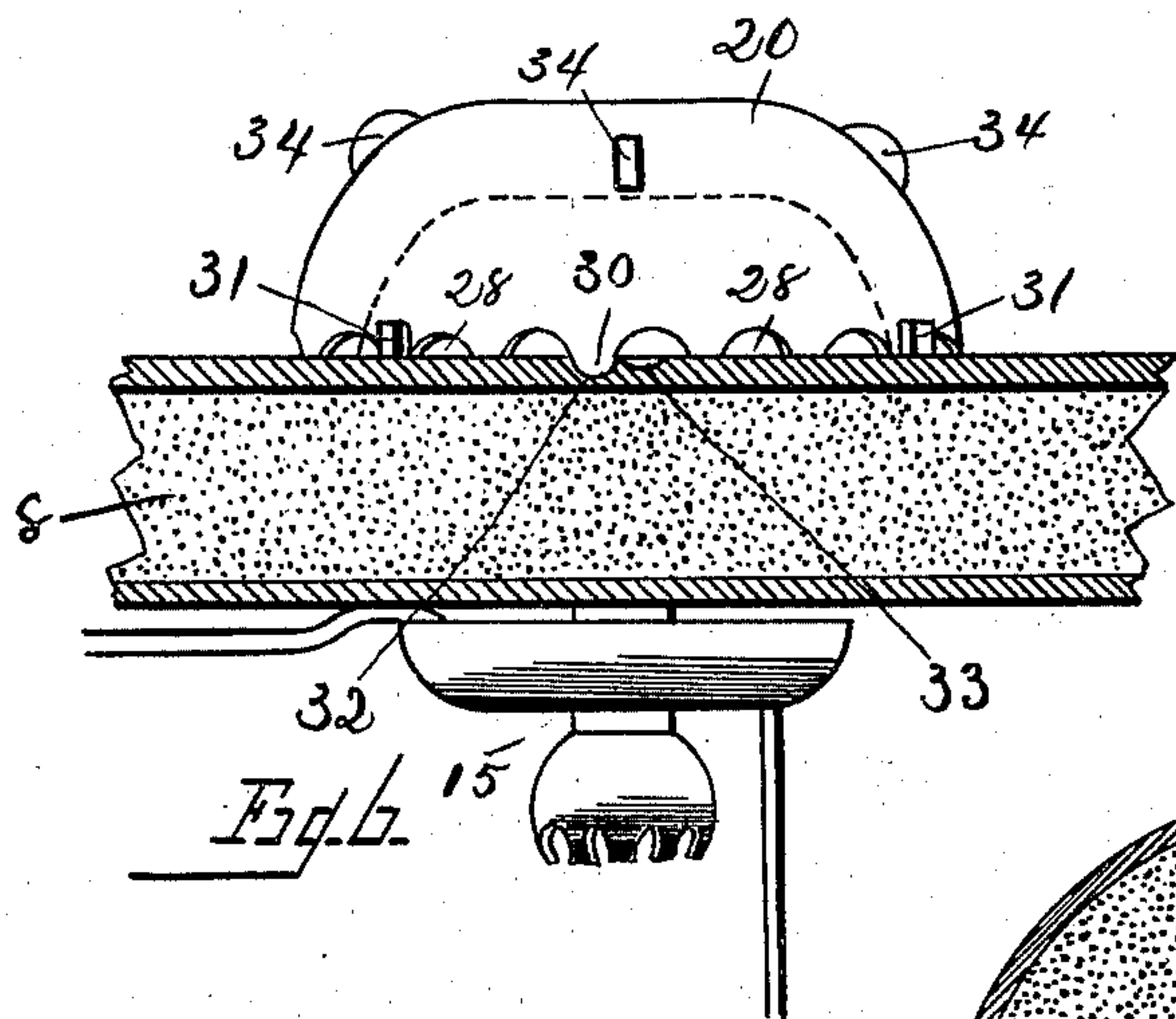
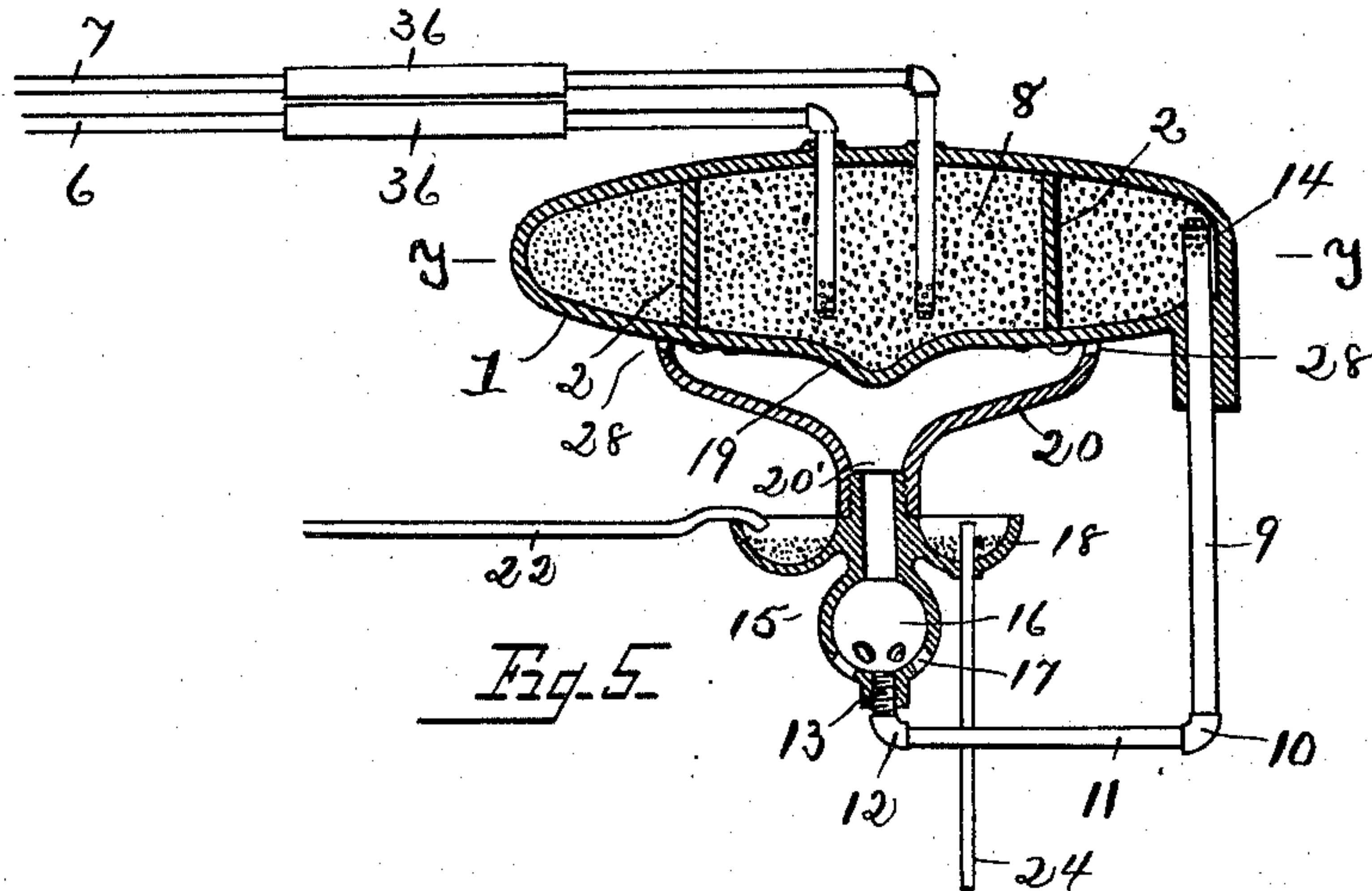
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HYDROCARBON BURNER.

(Application filed Apr. 9, 1894. Renewed Jan. 13, 1898.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES

Carroll J. Webster  
Bertha M. Schweiger

INVENTORS

Daniel W. Bowman  
Edwin R. Kinney  
By William Webster  
Attor.

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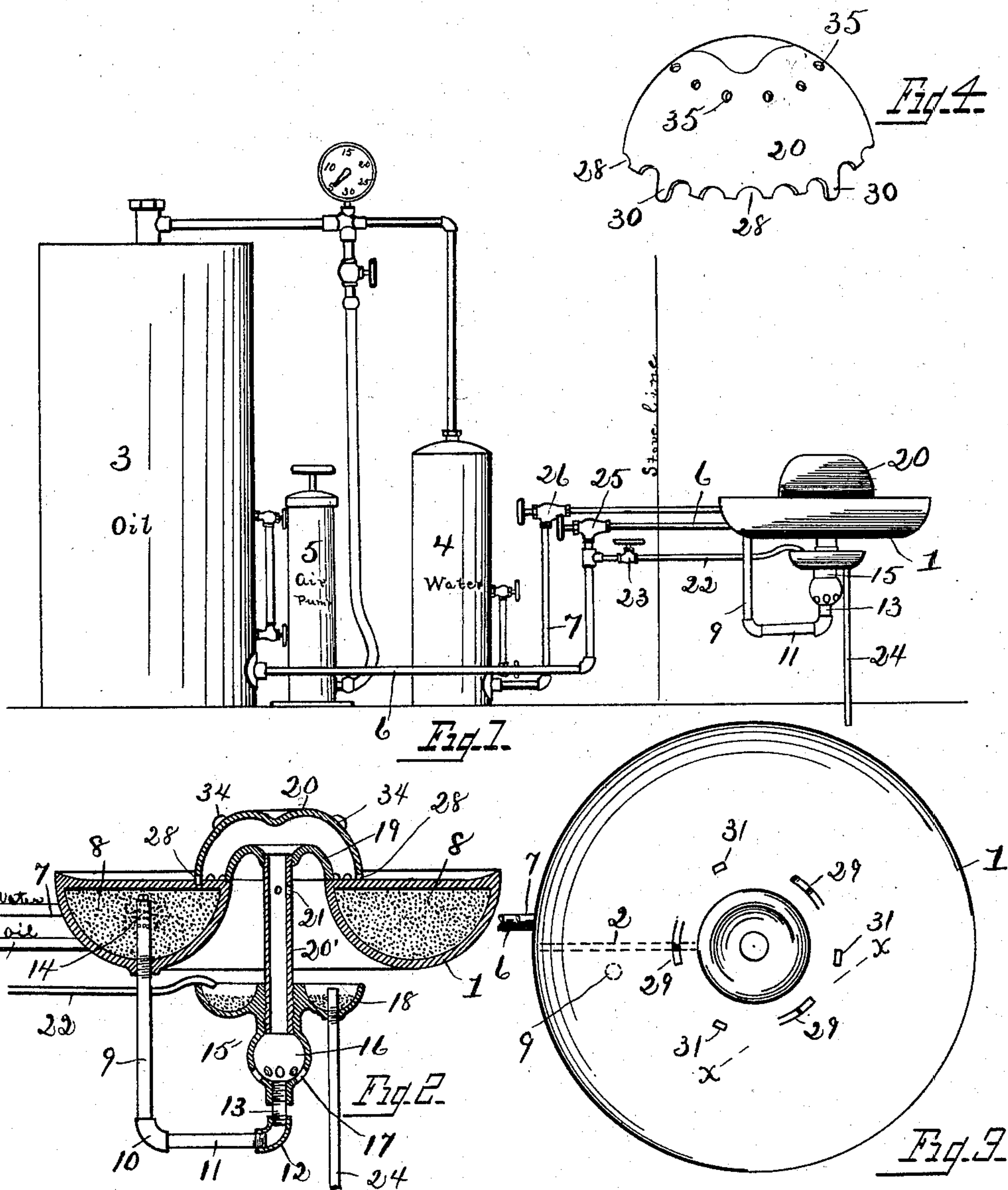
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Edwin R. Kinney,  
By William Webster.  
Atty.



# UNITED STATES PATENT OFFICE.

DANIEL W. BOWMAN AND EDWIN R. KINNEY, OF TOLEDO, OHIO, ASSIGNORS  
TO SAID BOWMAN AND EDWARD W. KOHNE, OF SAME PLACE.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 608,025, dated July 26, 1898.

Application filed April 9, 1894. Renewed January 13, 1898. Serial No. 666,577. (No model.)

*To all whom it may concern:*

Be it known that we, DANIEL W. BOWMAN and EDWIN R. KINNEY, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in Hydrocarbon-Burners; and we 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 it appertains to make and use the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form part of this specification.

Our invention relates to a hydrocarbon-burner, and has especial relation to a burner for oil or other hydrocarbon fuel in which the oil is vaporized and mixed with sufficient quantity of air to support combustion and burn the gas.

The object of the invention is to provide a burner in which all the products of combustion are evolved from the oil during vaporization, thereby making a clean fire without carbonization. To accomplish this object, we provide a vaporizer having the interior so divided that the oil and gas as it is vaporized therein must travel the entire surface of the vaporizer. We also fill the vaporizer with sand, gravel, or analogous non-combustible material, which has the effect to retard and superheat the oil and gas, thereby evolving all the heat-units from the oil. By this means the formation of carbon is prevented. We also provide for uniting steam with the gas within the vaporizer, supplying air to the mixed gas and steam, and leading the same to a burner so constructed that it should properly distribute the flame to the vaporizer so as to give the necessary heat to the same to vaporize and superheat the gas and steam therein.

The invention further consists in the details hereinafter shown, described, and claimed.

In the drawings, Figure 1 is an elevation of a burner, oil and water tank and connections between the same as constructed and arranged in accordance with our invention. Fig. 2 is a sectional elevation of the vaporizer and a portion of the necessary pipes for sup-

plying oil and water. Fig. 3 is a plan view of a vaporizer, illustrating more particularly the dividing-wall and the relation of the inlet and outlet for the oil and water and gas, respectively. Fig. 4 is a detail view of an adjustable upper section of the burner, showing a modified form for use in cook-stoves. Fig. 5 is a detail view of the vaporizer and burner, showing a modified construction. Fig. 6 is a sectional elevation taken through the vaporizer at a point indicated by lines *xx*, Fig. 3, the burner being shown in position upon the vaporizer, this view illustrating more particularly the manner of adjusting the size of the burner to regulate the same to the quantity of gas flowing therethrough. Fig. 7 is a sectional view through the vaporizer shown in Fig. 5, the view being taken on lines *yy*, Fig. 5. Fig. 8 is a detail view of a portion of the gas-pipe, illustrating more particularly the jet-orifices therein, through which the gas is forced.

1 designates the generator, ring-shaped, as shown in Fig. 2, which comprises a hollow casting the interior of which is divided by a web 2.

3 designates the oil-tank, and 4 a water-tank which when pressure is put thereupon by means of the air-pump 5 oil and water are forced through pipes 6 and 7, respectively, into the generator, preferably at a point near the web 2, as shown in Fig. 3. The generator is packed with sand, gravel, or analogous non-combustible material, as shown at 8.

9 designates the gas-pipe, extending into the generator to near the top thereof, the lower end being provided with an L 10, into which is secured a horizontal pipe 11, having an L 12 at the opposite end, into which fits a vertical section of pipe 13. Pipe 9 is closed upon the upper end and provided with a series of perforations 14, which are of a size smaller than the filling within the generator, the object being to prevent the filling from passing into the gas-pipe with the gas. The oil and water pipes 6 and 7, respectively, are also perforated near the ends inside of the generator for a like purpose.

Secured upon the vertical pipe 13 is a com-



bined mixer and oil-cup 15, which comprises a mixer 16, having the orifice 17 for the admittance of air, and the oil-cup 18, which is filled with sand, gravel, or analogous non-combustible material.

19 designates the lower section of the burner, and 20 designates the upper section. Section 19 can either be cast integral with the generator or may be a separate part thereof, and connecting the oil-cup and section 19 is a pipe 20'.

21 designates a series of perforations in the pipe 20' for heating the under part of the generator.

22 designates a pipe connecting the oil-pipe at one end, the opposite end passing to a point above the oil-cup, said pipe being provided with a valve 23, by which to control the flow of oil therethrough.

The operation of the device thus far described is as follows: The oil and water tanks are filled, the water-tank having, preferably, about one-sixteenth the capacity of the oil-tank, it being found that a proportion of a sixteenth water will give the best results, although we wish it to be understood that this proportion may be varied without departing from the spirit of our invention. Pressure is now put upon the tanks by means of an air-pump, it being found that about five pounds pressure give the best results, when valve 23 in pipe 22 is opened until the oil-cup 18 is filled, the oil being prevented from accidentally overflowing by means of the overflow-pipe 24, which extends to near the top of the oil-cup at the upper end and may extend beneath the floor or to a desired receptacle at the lower end. Valve 23 is now closed and the oil in the oil-cup is ignited, the products of combustion impinging against the vaporizer, heating the same and the filling therein. Valves 25 and 26 in the oil and water pipes, respectively, are now opened and oil and water allowed to flow into the generator, which is heated to a degree to vaporize the same, forming vapor and steam, which unite, and the mixture travels around the generator, through the filling, is superheated and flows through the gas-pipes 9 and 11, is forced through the jet-orifices 27 in the nipple 13, through the mixer, drawing in sufficient quantity of air, and into the burner, and is forced through the orifices 28 in the periphery of section 20 of the burner. The heat impinging upon the vaporizer continues to heat the same, the products of combustion arising therefrom serving for domestic or heating purposes.

The vaporizer is of a size to vaporize all the oil necessary to be received therein, either to make a small or a large fire; but to accomplish this purpose the burner must be adjustable—that is, its capacity must be enlarged or diminished to receive and properly distribute the gas. This adjustability in the burner is also necessary to reduce the noise of the gas incident to the escape of the gas

through the burner, where a large quantity would be forced through the orifices when set or adjusted for a small fire. To accomplish this end, we preferably form a section 19 of the burner stationary and the section 20 adjustable, which increases both the interior and the exit orifices in the burner. To accomplish this end, we form, preferably, three grooves 29 in the top of the generator and form lugs 30 upon the upper section of the burner to coincide therewith, it being understood that the upper section of the burner is held from displacement by the lugs 31, projecting outwardly from the generator. We preferably provide for three adjustments to the upper section of the burner, by which means a small, medium, or large fire is provided for. We therefore form the grooves 29 in steps, the lower one 32 being of a depth to, when the lugs 30 rest therein, allow the upper section of the burner to rest upon the generator, as shown in Fig. 6, the upper step 33 of the grooves raising the upper section of the burner, say, one-eighth of an inch, increasing the space between the two sections of the burner and between the upper section and the generator, and when the lugs rest upon the generator the upper section is raised, say, one-fourth of an inch, increasing the capacity of the burner as much again.

To revolve the upper section of the burner to adjust the same, we provide lugs 34, with which any desired object may be contacted to turn the same.

While we have shown three adjustments to the upper section, it will be readily understood that as many adjustments may be provided for as desired, and while we have shown and described specific means we wish it understood that we do not confine ourselves to any specific means, as any means may be used without departing from the spirit of our invention.

In Fig. 4 is shown a modified form of the upper section of the burner adaptable for cook-stoves, which comprises a series of perforations 35, through which a portion of the gas escapes and impinges against the lid or pots which may be placed thereon.

In Fig. 5 is shown a modification in which the burner is placed beneath the generator, the adjustment of one section of the burner in this construction being shown different from that heretofore described and comprises a quick thread upon the nipple 13, upon which the mixer screws. Therefore as the section of burner is revolved it is raised or lowered at the will of the operator and the conditions of the burner are changed, as heretofore described. This view also shows a modified form of the generator, in which the oil and water is led to the center of the same and travels around the same. The generator being divided by a web forces the commingled gas and steam to travel the full surface of the generator with the same operation, as described.



It will be seen by referring to Figs. 2 and 5 that we provide for the entrance of the fuel at the coolest point of the burner. In Fig. 2 it is taken in at the bottom, the greatest heat in this instance being at the top. In Fig. 5 it is taken in at the center, the greatest heat being near the peripheries of the generator.

In this construction the flame impinges upon the oil and water pipes. Therefore to keep the same from burning out we provide a protector 36, which comprises an enveloping pipe forming a chamber between the protector and the pipe through which air may circulate.

What we claim is—

1. In a hydrocarbon-burner, an annular generator having a filling of sand or gravel, an oil-pipe leading thereto, an oil-pipe connecting the generator and a burner, said burner comprising a plate or cup the outer edge of which rests upon the inner edge of the generator, and a plate or cup of greater dimensions resting upon the generator, said second plate or cup having a series of orifices in its

outer edge, and means for moving the upper cup or plate vertically to increase or diminish the space between the cups or plates and the edge of the movable cup or plate and the generator, whereby the conditions of the burner remain the same for either a large or a small fire.

2. In a hydrocarbon-burner, a generator, an oil-pipe leading therein, a gas-pipe leading therefrom to a burner, the upper section of said burner being provided with lugs which coincide with the stepped recesses in the generator, by which the upper section of the burner is adjusted vertically.

In testimony that we claim the foregoing as our own we hereby affix our signatures in presence of two witnesses.

DANIEL W. BOWMAN.  
EDWIN R. KINNEY.

Witnesses:

CARROLL J. WEBSTER,  
BERTHA M. SCHWEIZER.