

No. 868,457.

PATENTED OCT. 15, 1907.

H. LEMP.
HYDROCARBON BURNER.
APPLICATION FILED APR. 12, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

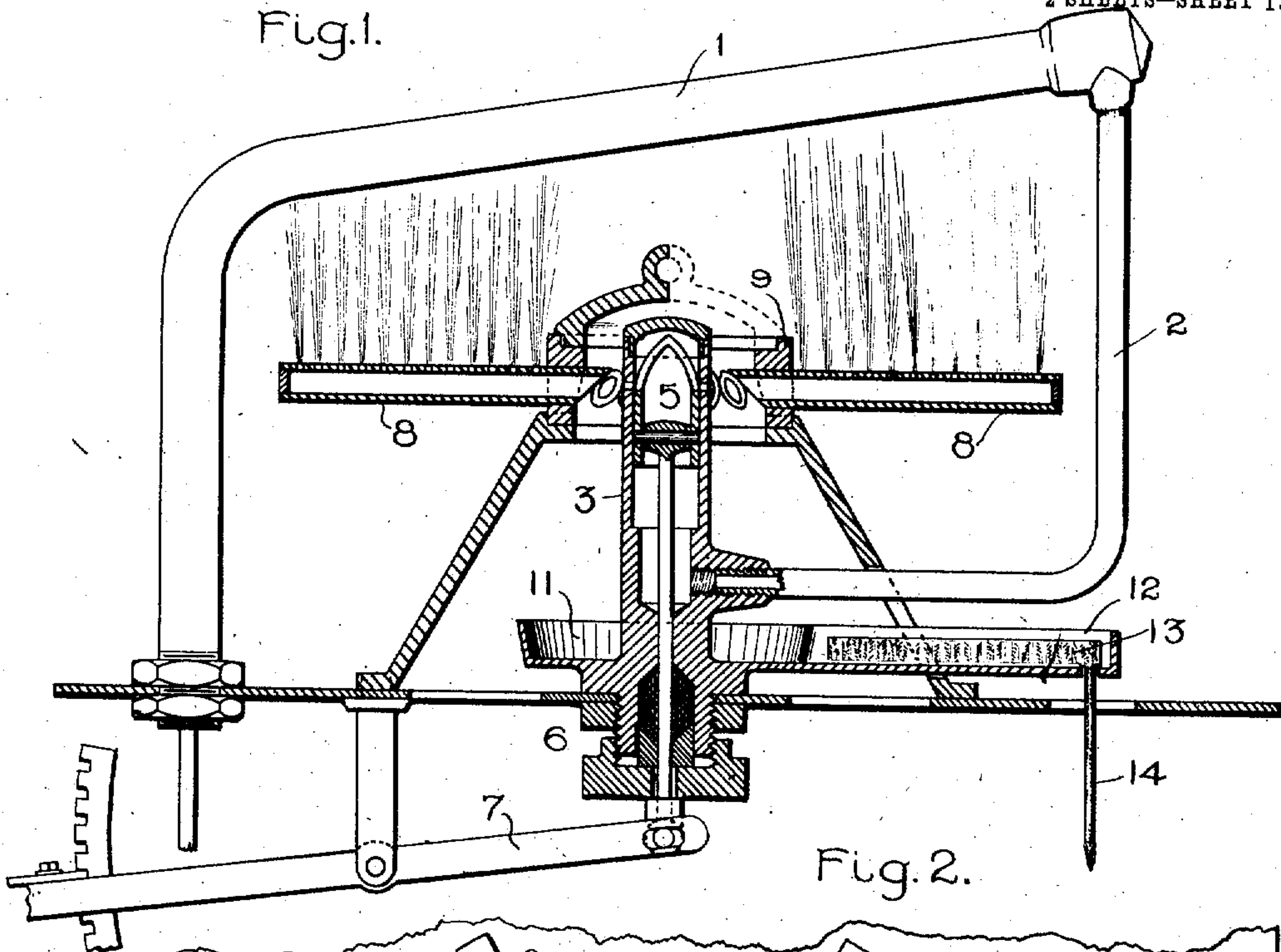
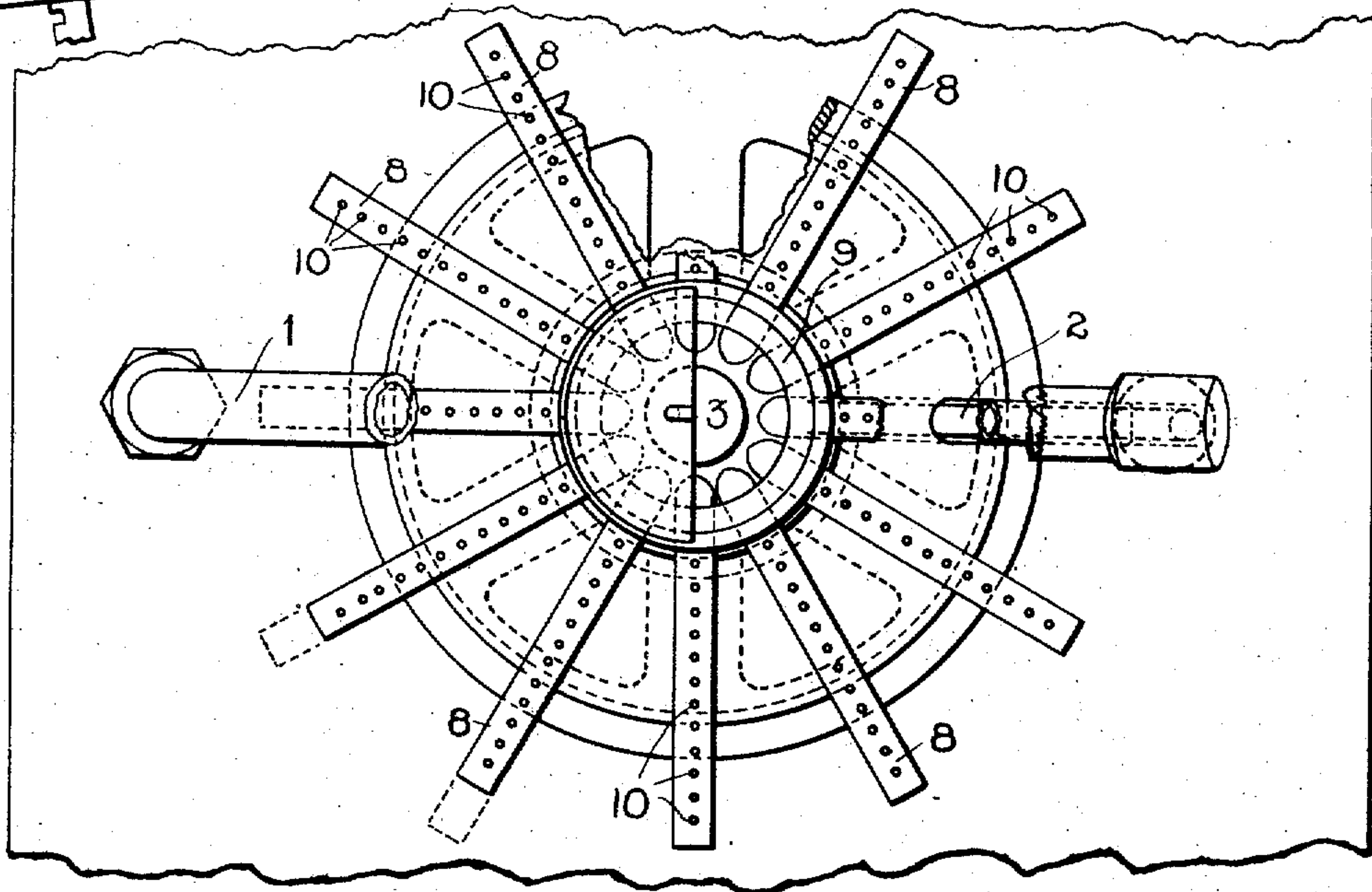


Fig. 2.



WITNESSES.

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2 SHEETS—SHEET 2.

Fig. 5.

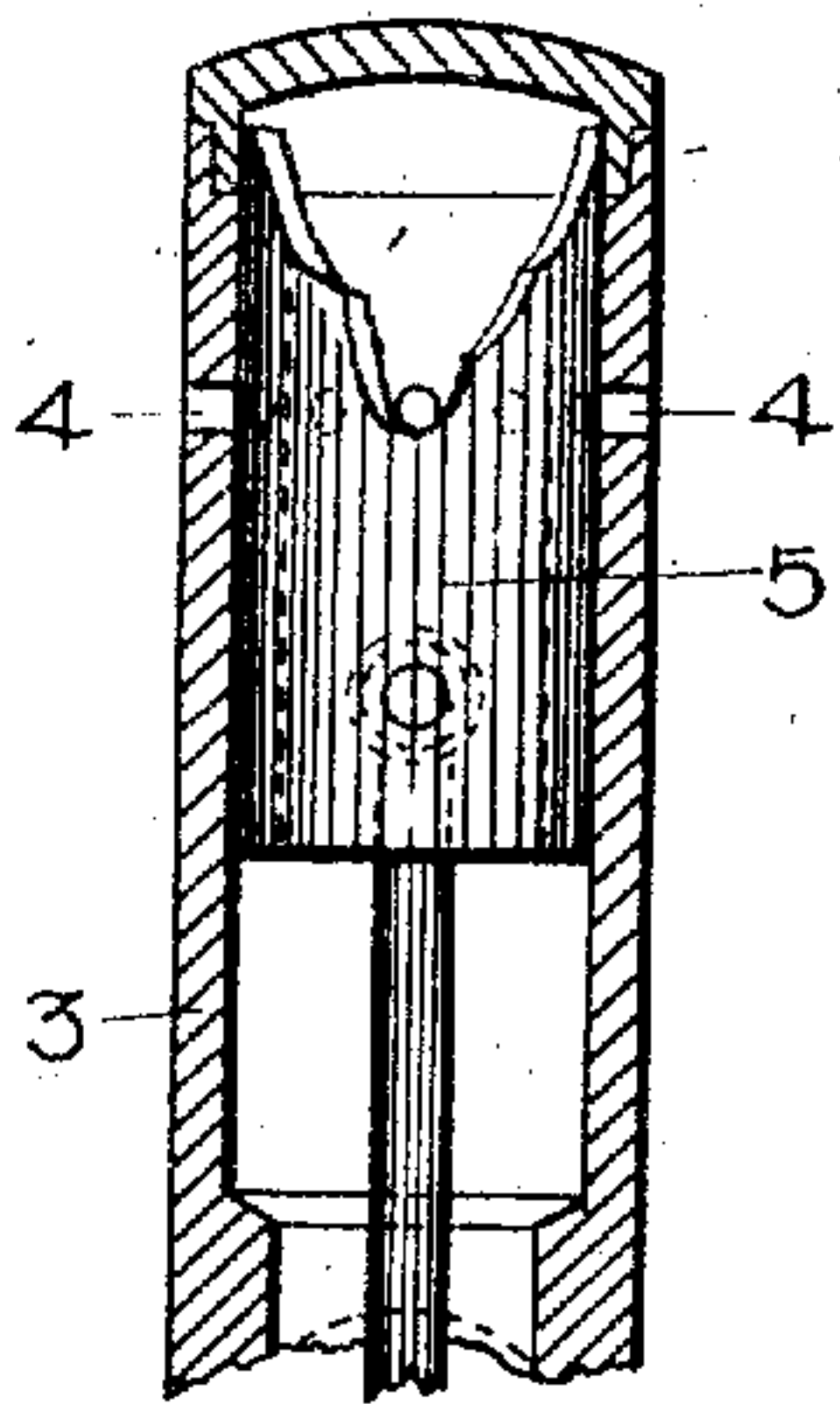


Fig. 4.

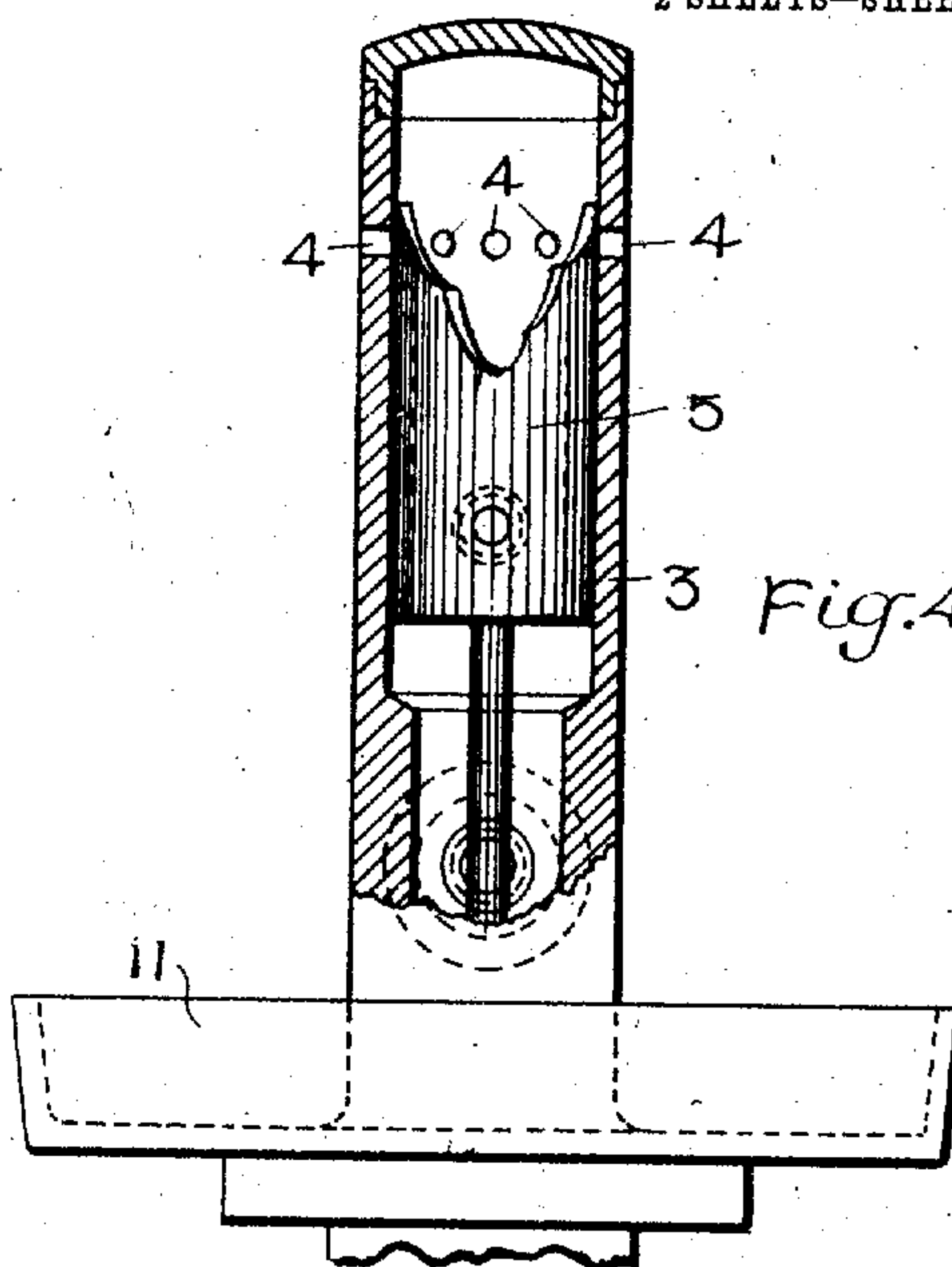


Fig. 3.

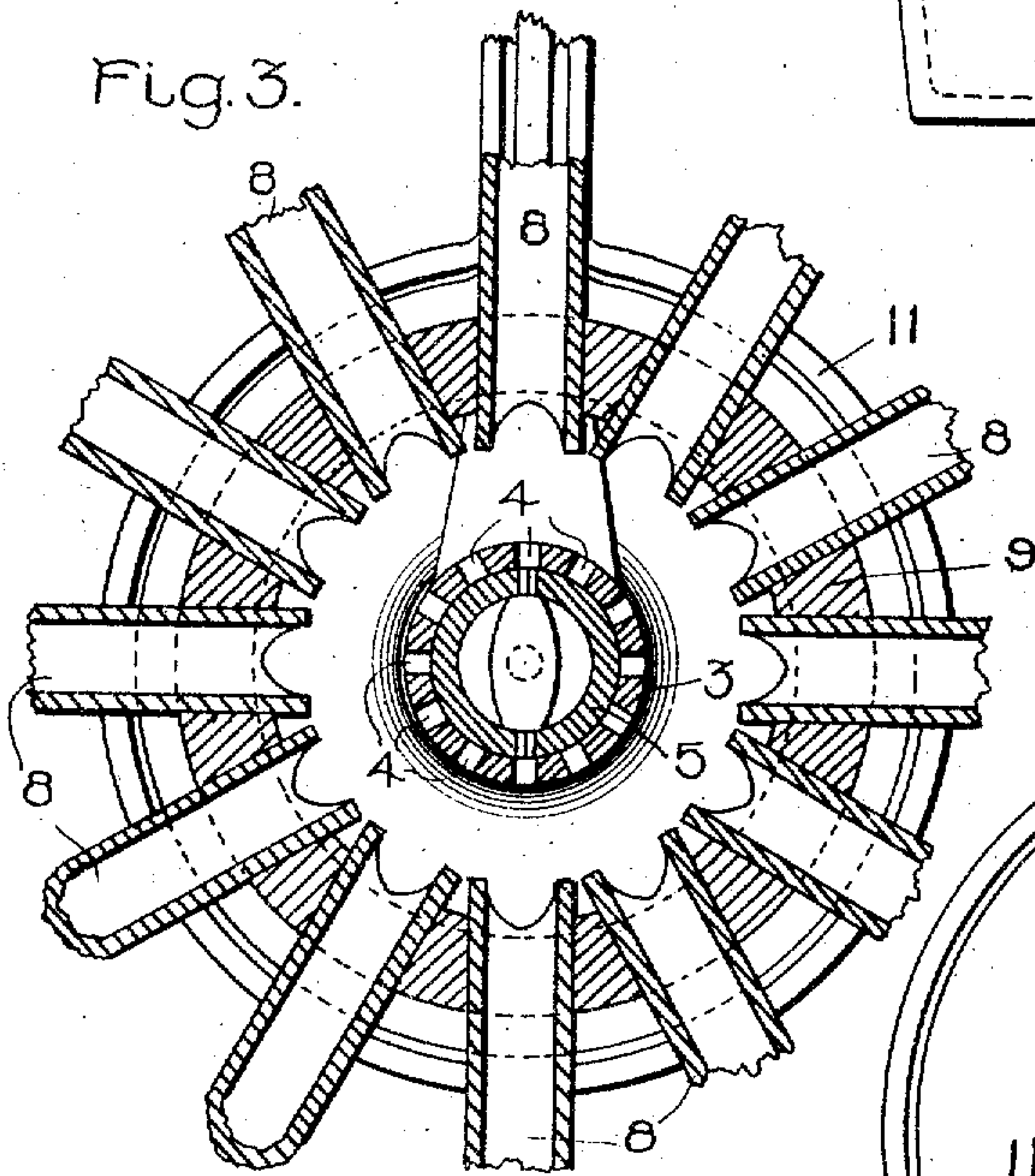
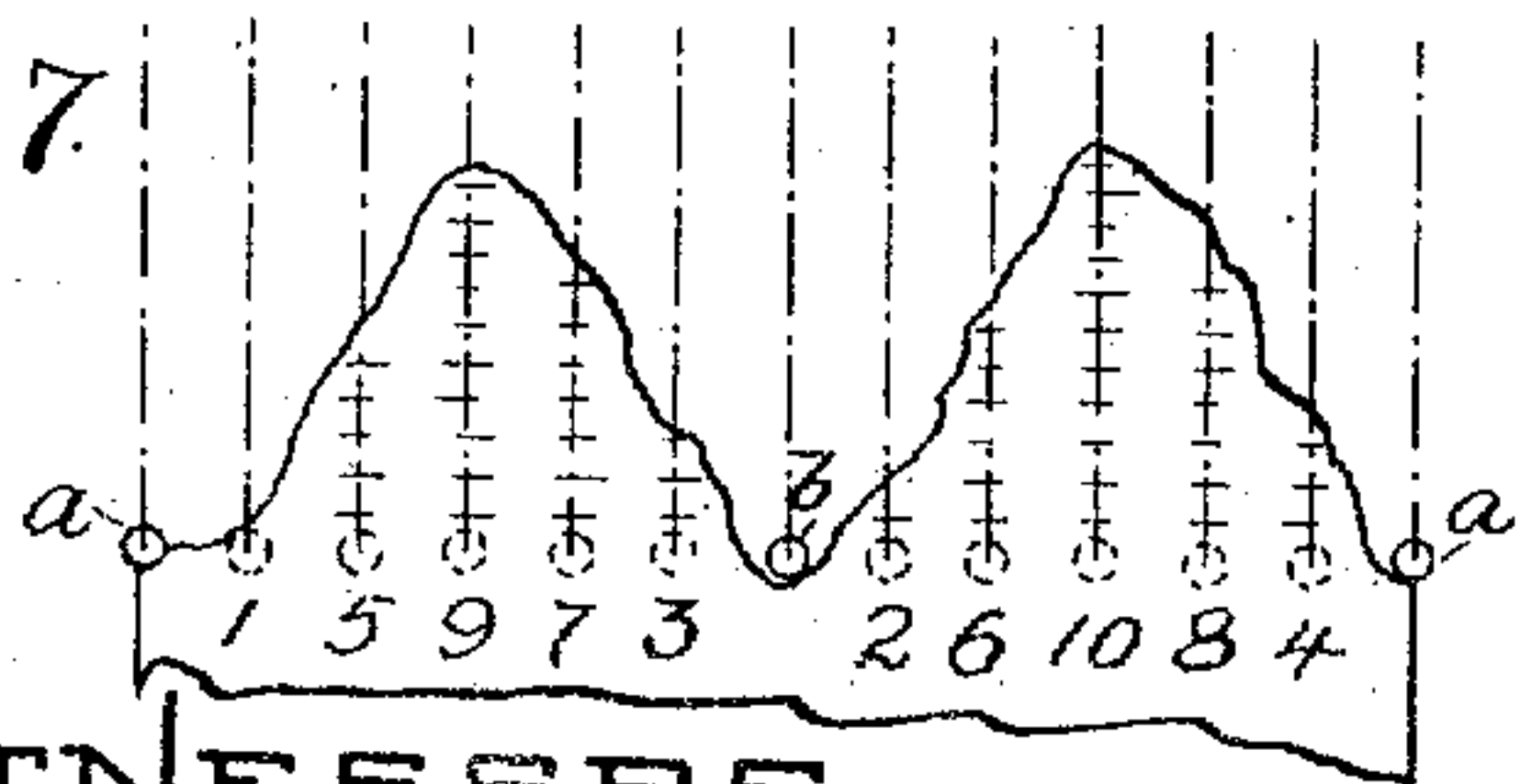


Fig. 7.



WITNESSES.

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UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

HYDROCARBON-BURNER.

No. 868,457.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed April 12, 1902. Serial No. 102,493.

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Hydrocarbon - Burners, of which the following is a specification.

This invention relates to burners for hydrocarbon liquids, and especially kerosene oil. Its object is to provide a burner of the injector type, which can be controlled either by hand or automatically to vary the intensity of the fire as circumstances may require.

The invention has especial reference to steam carriages, but is evidently applicable to a variety of uses.

In some burners of this type it has been found necessary to use a variable opening for the mixed gases conjointly with a variable opening in the vapor-nozzle. If the oil pressure is increased without changing the area of the air opening, the excess of vapor will produce a yellow flame. If, on the other hand, the air opening is too large for the pressure at which the vapor issues from the nozzle, then the velocity in the mixing-tube is too low and the flame will shoot back and burn on the inside. It has therefore been necessary either to regulate both the air and vapor openings carefully and simultaneously, or to keep the burner full on while running and then shut it off completely while the pilot burner only is left lighted.

In the present invention, the regulation is accomplished by providing a plurality of mixing-tubes and a plurality of vapor openings, one for each tube, and a valve which will quickly and completely shut off any number of said openings at will, thus cutting in or out of service as many mixing-tubes as may be needed. The vapor pressure is maintained constant, so that the relative quantities of vapor and air supplied to each tube are always the same, and the flame from each tube is always of a given intensity. When one or more of the openings in the nozzle are closed there will be an increase in pressure in the nozzle, but this is only momentary, as the increased pressure forces oil out of the vaporizer back into the tank and thus reduces the generation of vapor. The reverse takes place when more holes are opened. Each tube is either wholly shut off or fully turned on, there being no intermediate stages. This is readily accomplished by providing the valve-controlling lever with some suitable device for stopping it in positions corresponding with the full opening of the several tubes.

In the accompanying drawings, Figure 1 is a sectional elevation of a burner embodying my invention; Fig. 2 is a top plan view of the same partly broken away; Fig. 3 is a horizontal section through the valve and the inner ends of the mixing-tubes, on a larger scale; Fig. 4 is a sectional elevation of the vapor-nozzle and valve, on a larger scale, showing the valve wide open; Fig. 5 is a

sectional elevation of the same, showing the valve closed; Fig. 6 is a top plan view of the vapor-nozzle and igniting tray; and Fig. 7 is a development of the valve and vapor nozzle.

The oil is forced under pressure into the lower end of the inclined vaporizer 1, which stands above the burner, and communicates therewith by a depending pipe 2, which enters the side of the vapor-nozzle 3. This is preferably an upright cylindrical tube having a closed top and bottom, and provided near its upper end with a plurality of small holes 4. Inside the tube is a valve 5, which is suitably constructed to control said holes, in such manner that they will be closed or opened in succession as the valve is moved. The stem of the valve passes through a stuffing-box 6 at the bottom of the tube, and is connected with a lever 7 or other suitable means for moving it lengthwise of the tube.

The lever is preferably provided with some means such as a notched quadrant and latch, shown in Fig. 1, to hold it in positions corresponding to the full open and closed condition of the several holes.

The vapor-nozzle is not necessarily upright, and various arrangements of holes and shapes of valve may be used to effect the stated result, but I prefer the construction shown, the holes being in a plane perpendicular to the axis of the tube, and the valve being a cylindrical tube having a substantially V-shaped cut in its upper end. When this valve is at the top of the vapor-nozzle as shown in Fig. 5, all the holes are closed except two on opposite sides of the tube, which feed the pilot burners. As the valve moves down it opens the holes in succession.

In order to open or close the holes in succession the side of the V-shaped slot are irregularly waved or undulated, as shown in the development of the valve and vapor nozzle, Fig. 7. In the development the holes *a* and *b* are those which supply vapor to the two diametrically opposite mixing tubes located under the vaporizer for supporting the pilot flame. The valve is shown in its raised position and as it is moved downwardly the holes are opened in successive order as numerically marked, 1, 2 and 3, etc.

Directly opposite each hole 4 is a mixing-tube 8 having a closed outer end and an inner end open to admit the air drawn in by the jet of vapor issuing from the hole 4. The tubes may be arranged in any suitable manner, but I prefer to support them by their inner ends in a ring 9 concentric with the nozzle, and on lines radiating from said nozzle. Some of them may be longer than others, as indicated by the dotted lines in Fig. 2, when a non-circular space is to be occupied. Along the top of each tube is a row of fine burner-holes 10. The vaporizer 1 extends transversely over the entire burner, preferably on a diametrical line, as shown, and the tube or tubes immediately under it serve as

pilot burners to keep up the supply of gas when the full heating effect is not wanted. The other mixing tubes are brought into full service or cut out completely by the movement of the valve 5, as above set forth.

5 By arranging the vaporizer as shown oil will enter it at the coolest point, which prevents the same from carbonizing. As the oil is gradually heated the vapor given off at the upper end of the column will pass through the portion of the vaporizer extending across the burner from side to side, and in so doing have its temperature increased. Since the portion of the vaporizer extending across the mixing tubes and in the plane of two such tubes is inclined, the oil in liquid form cannot be trapped therein, thereby avoiding pulsations in pressure at the discharge orifices of the vapor nozzle.

The burner is started in the usual manner by allowing a small quantity of oil to escape through the vapor-nozzle into the surrounding tray 11, whence it flows into the arm 12 and is absorbed by the asbestos wick 13 therein and runs down the wick 14. A match applied to the latter will set fire to the oil and heat the vaporizer tube 2 at its lower end until sufficient vapor is generated to start the main burner and set the vaporizer 1 in operation.

What I claim as new and desire to secure by Letters Patent of the United States, is—

1. A hydro-carbon burner comprising a nozzle having a plurality of vapor-discharging openings, a radially extending mixing tube opposite each opening having a closed outer end and an open inner end to receive a stream of vapor from the opening and also air induced by the stream, a longitudinally movable tubular valve arranged within the nozzle at a point intermediate the inlet end thereof and

the discharging openings and so shaped as to open or close successively a portion of said openings only, means for actuating the valve, and a vaporizer for the liquid fuel comprising a tube that first rises vertically and then extends over the mixing tubes and is heated by the flame therefrom.

2. A hydro-carbon burner comprising a nozzle having a plurality of vapor-discharging openings, a radially extending mixing tube opposite each opening which receives a stream of vapor therefrom and also air induced by the stream, a longitudinally movable tubular valve within the nozzle so shaped as to be capable of successively opening or closing all the discharging openings except two which supply vapor to their respective mixing tubes continuously, and a vaporizer common to all of the mixing tubes and comprising a tube that first rises vertically and then extends across the burner from side to side and is arranged to convey liquid fuel through the flames of the mixing tubes which are in continuous operation to vaporize the fuel and deliver it to the nozzle.

3. A hydro-carbon burner comprising an upright nozzle having a plurality of vapor-discharging openings, mixing tubes radiating from the nozzle which receive vapor from the openings and air induced thereby, one or more of the tubes receiving vapor continuously, a tubular valve longitudinally movable in the nozzle which is adapted to successively open or close the vapor-discharging openings except the one supplying the continuously operating mixing tube, a vaporizer for liquid fuel having one portion extending upwardly at one side of the nozzle and tubes and over the same from one side to the other at a slight inclination and another portion extending downwardly and connecting with the nozzle, and a starting burner arranged to receive fuel from the nozzle and to heat the downwardly extending portion of the vaporizer.

In witness whereof, I have hereunto set my hand this 9th day of April, 1902.

HERMANN LEMP

Witnesses:

DUGALD MCK. MCKILLOP
JOHN A. McMANUS.