

No. 624,372.

Patented May 2, 1899.

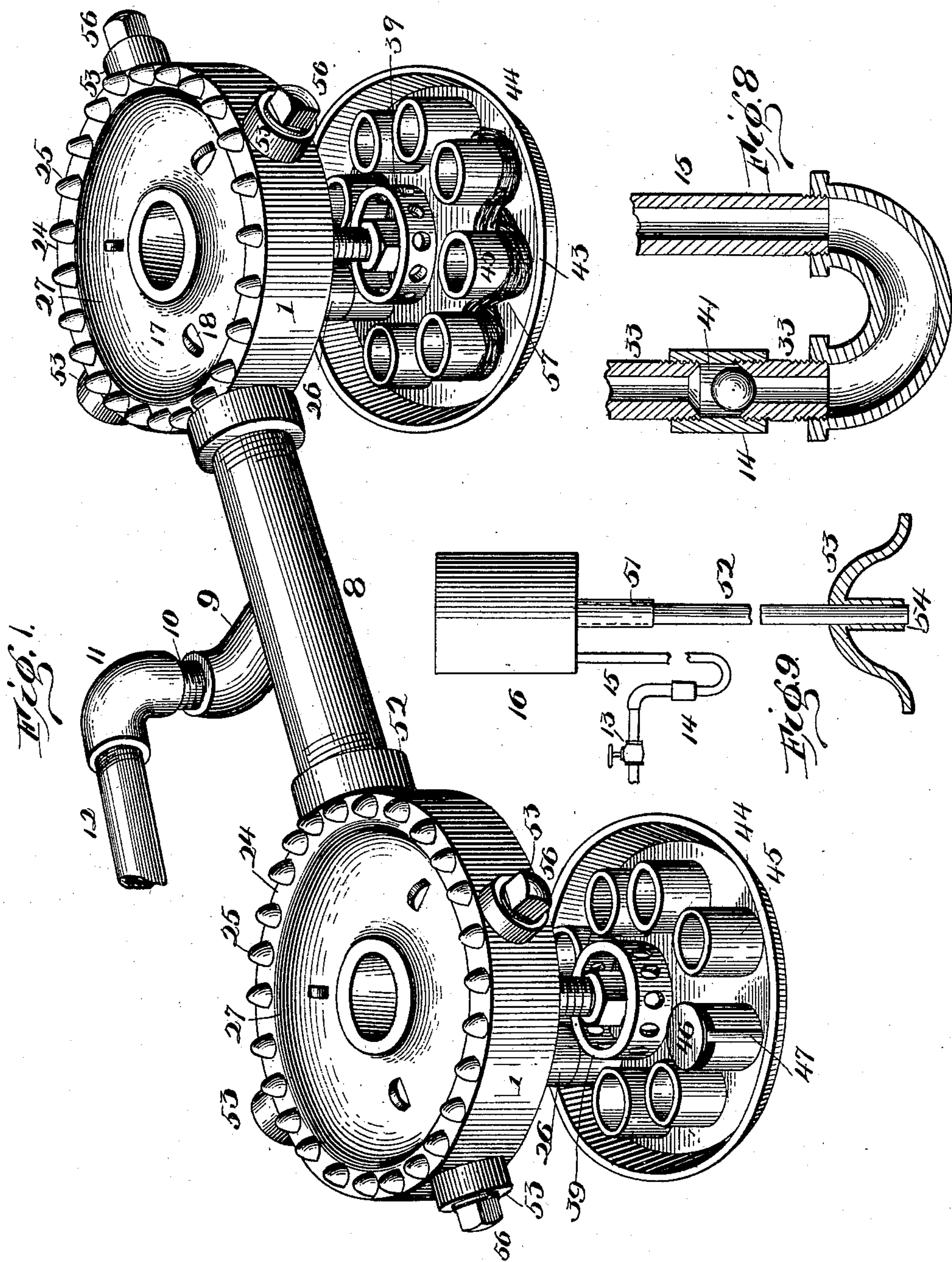
H. OGBORN.

BURNER FOR HYDROCARBON LIQUIDS.

(Application filed Aug. 1, 1898.)

(No Model.)

4 Sheets—Sheet 1.



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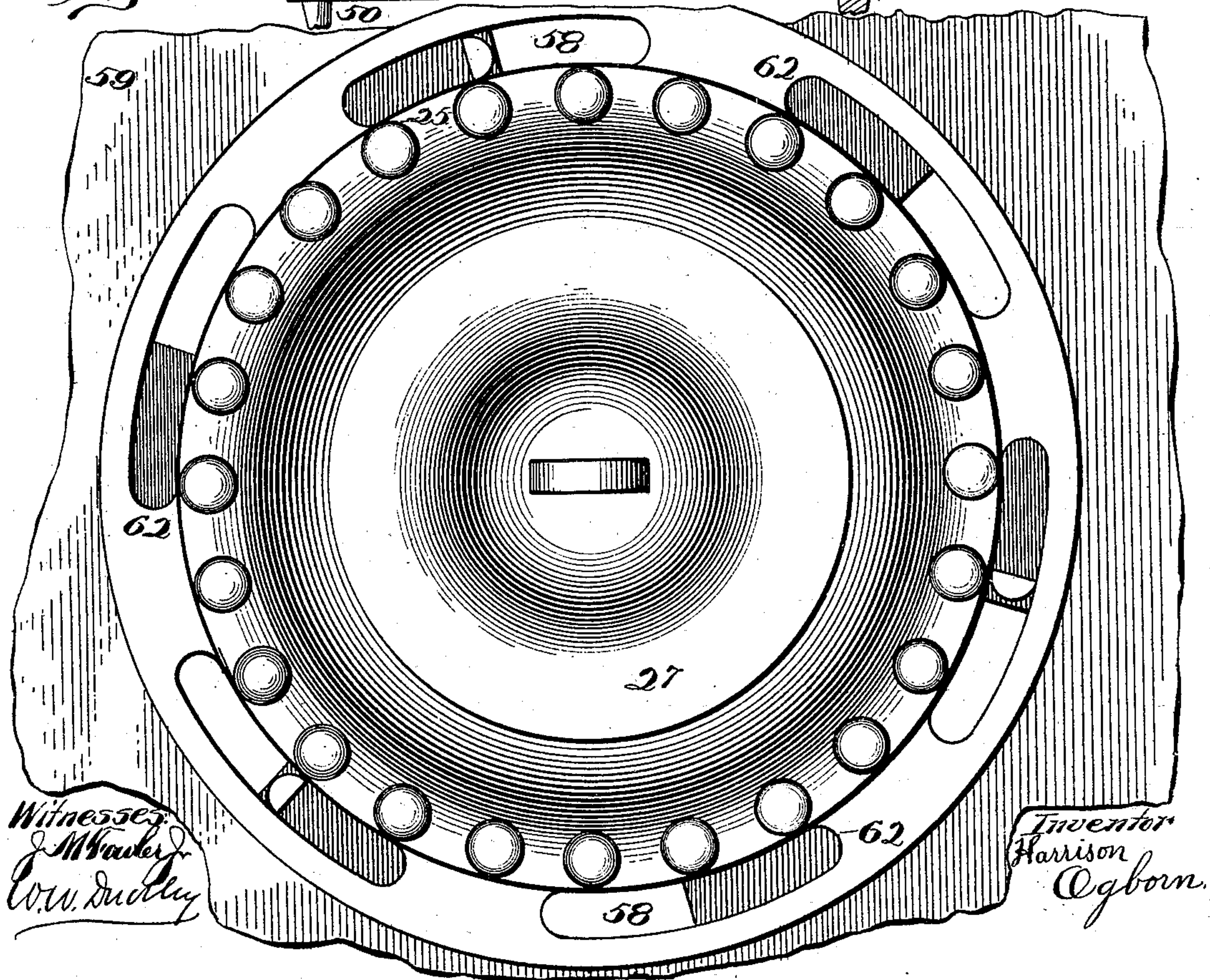
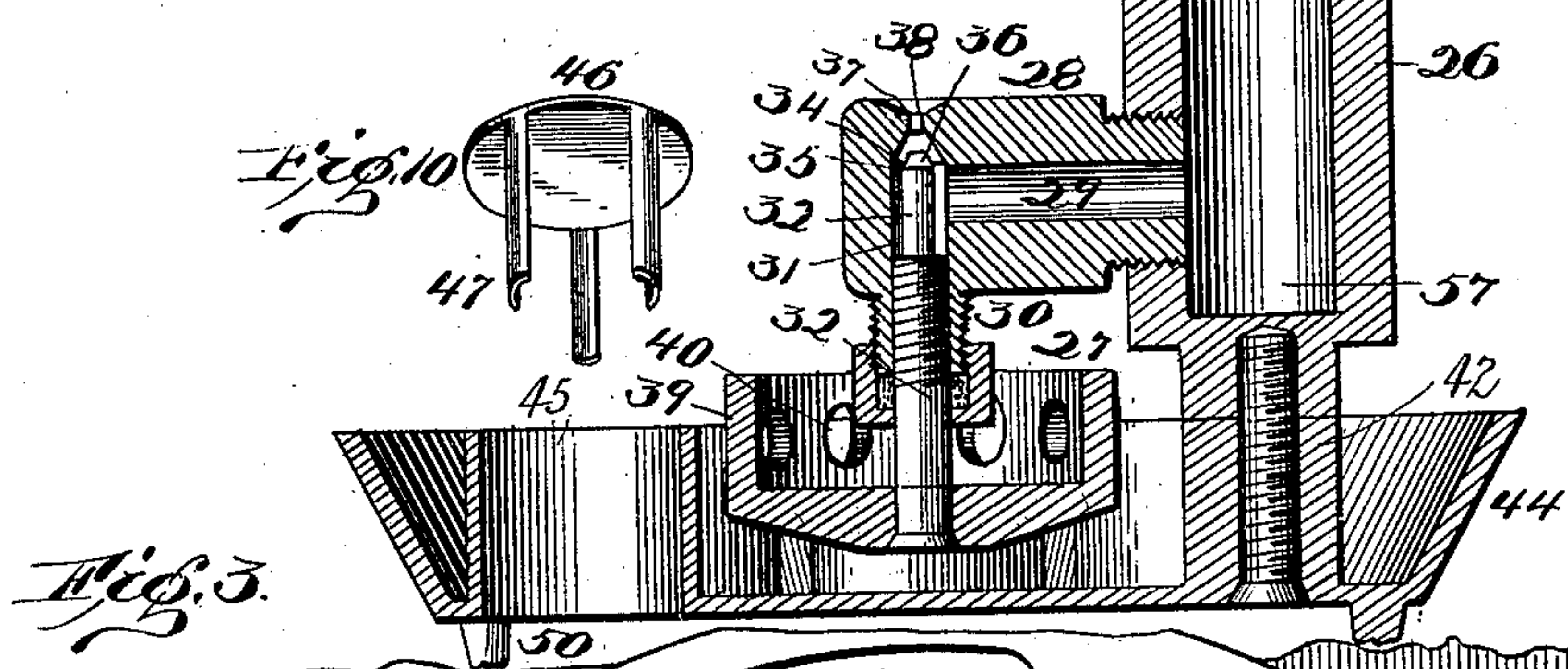
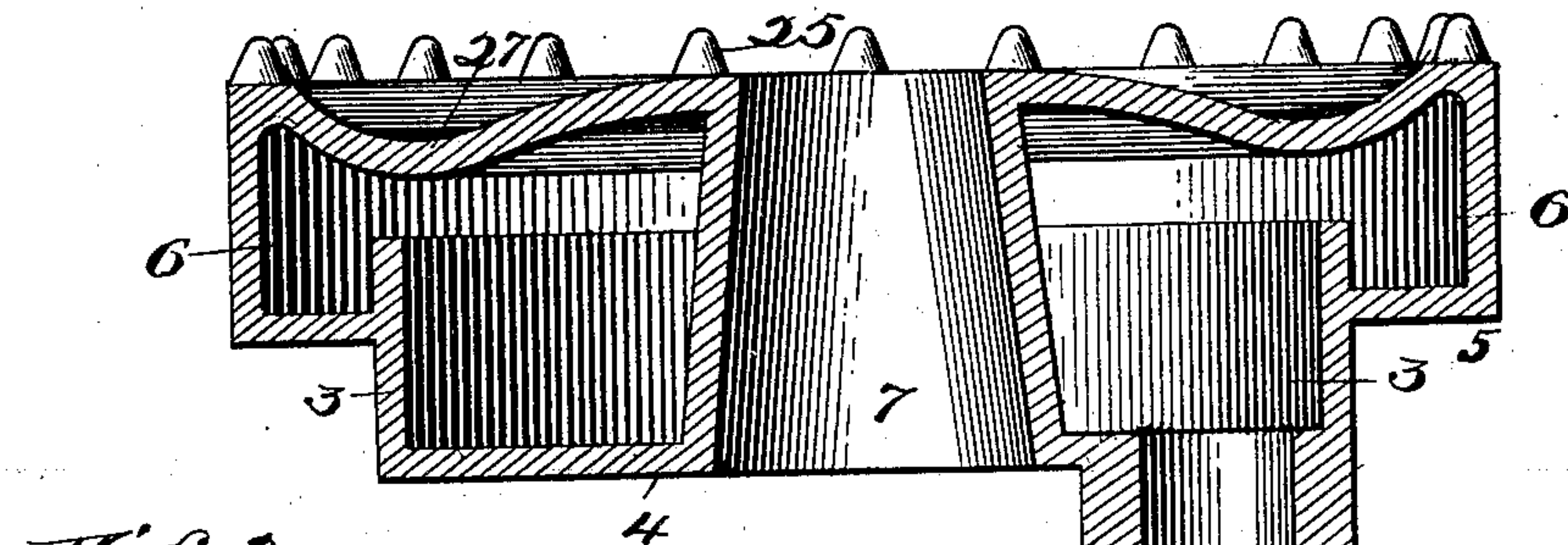
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4 Sheets—Sheet 2.



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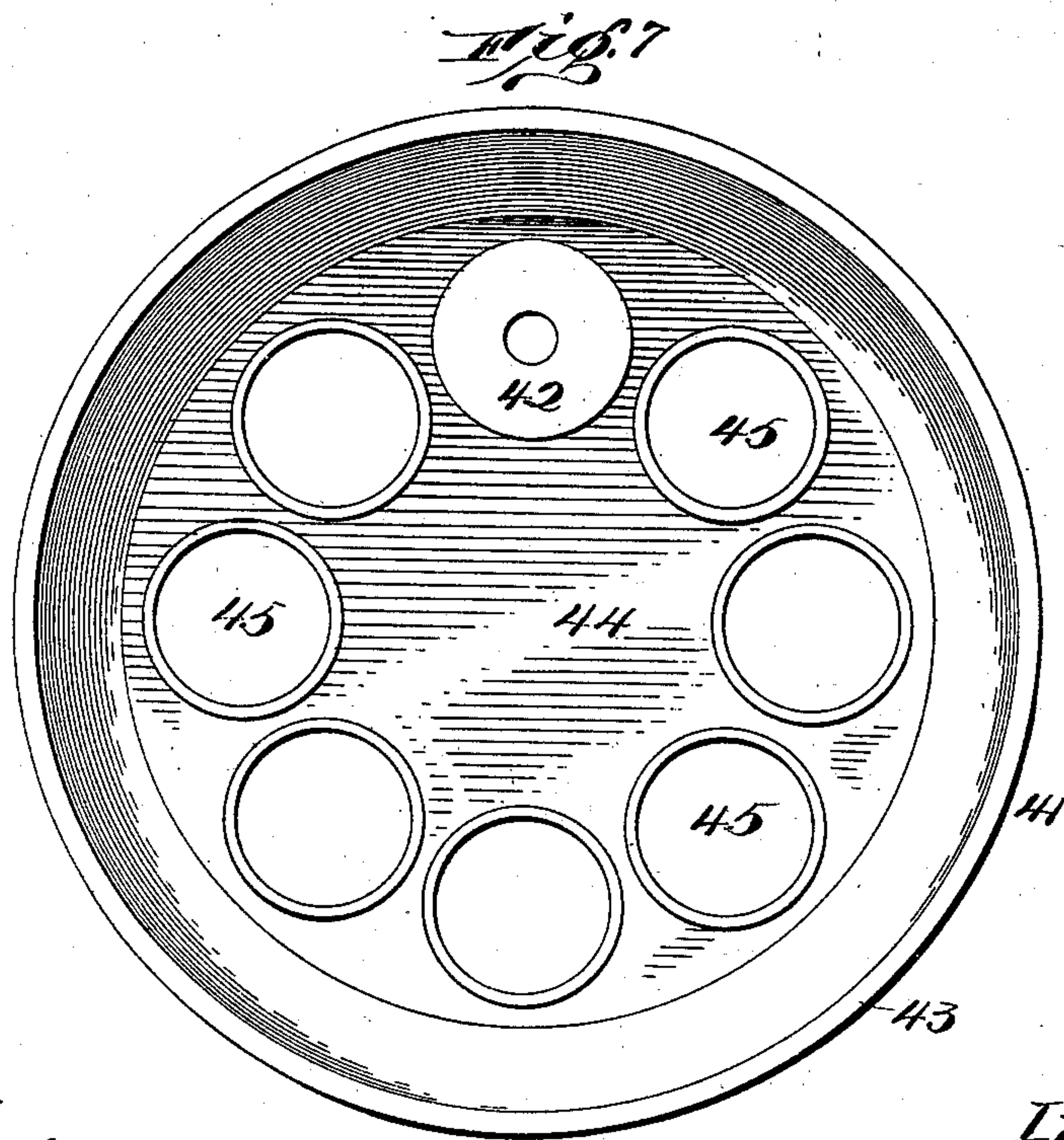
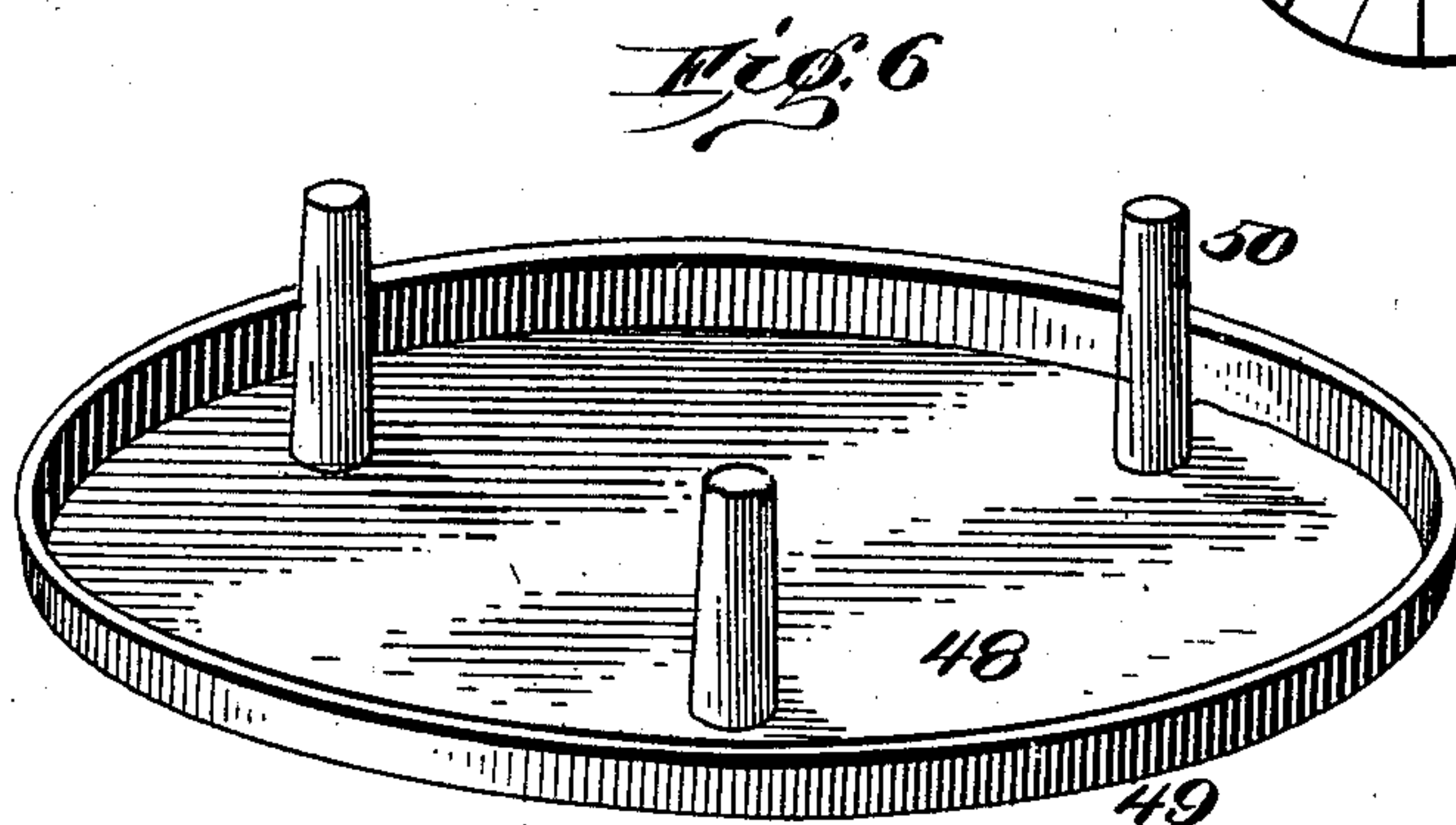
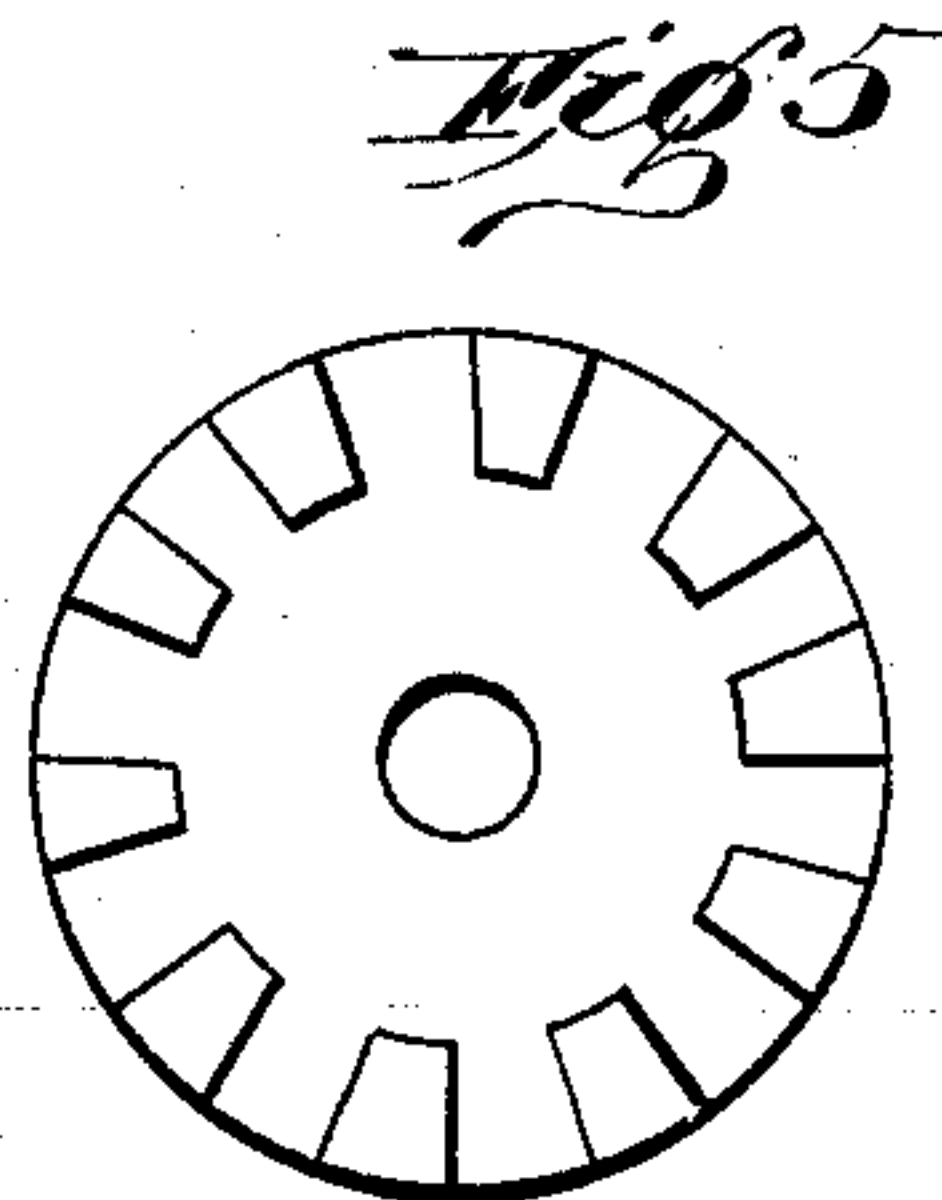
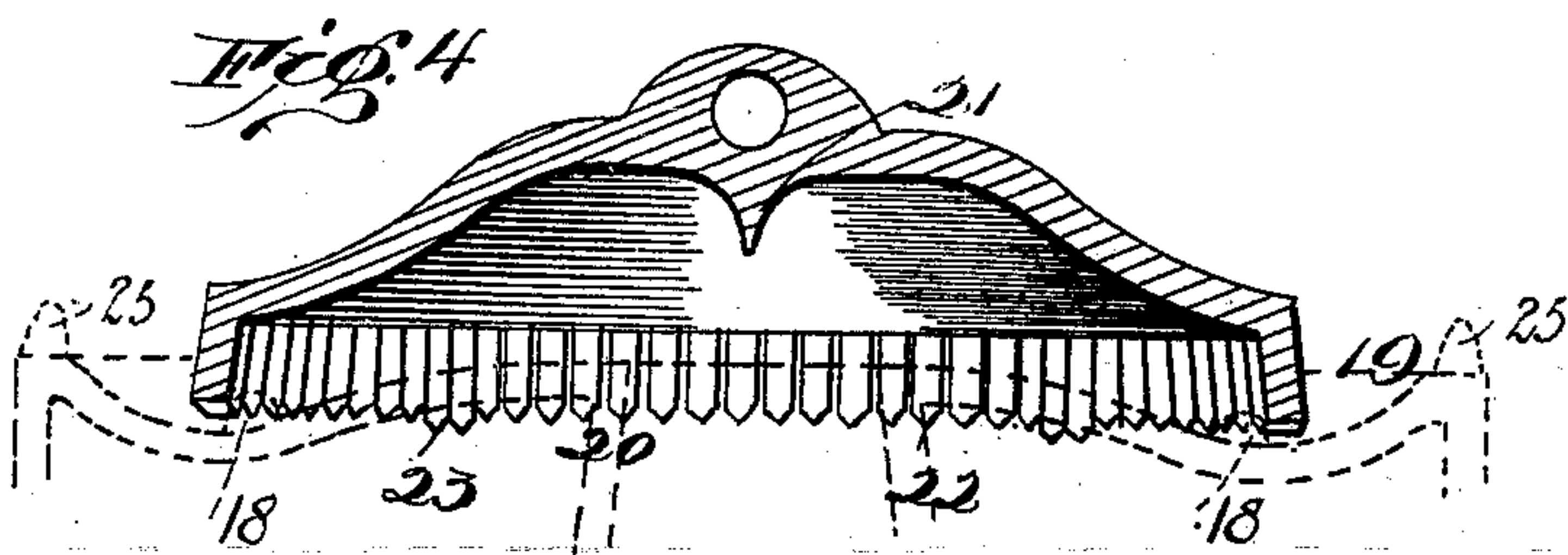
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(Application filed Aug. 1, 1898.)

(No Model.)

4 Sheets—Sheet 3.



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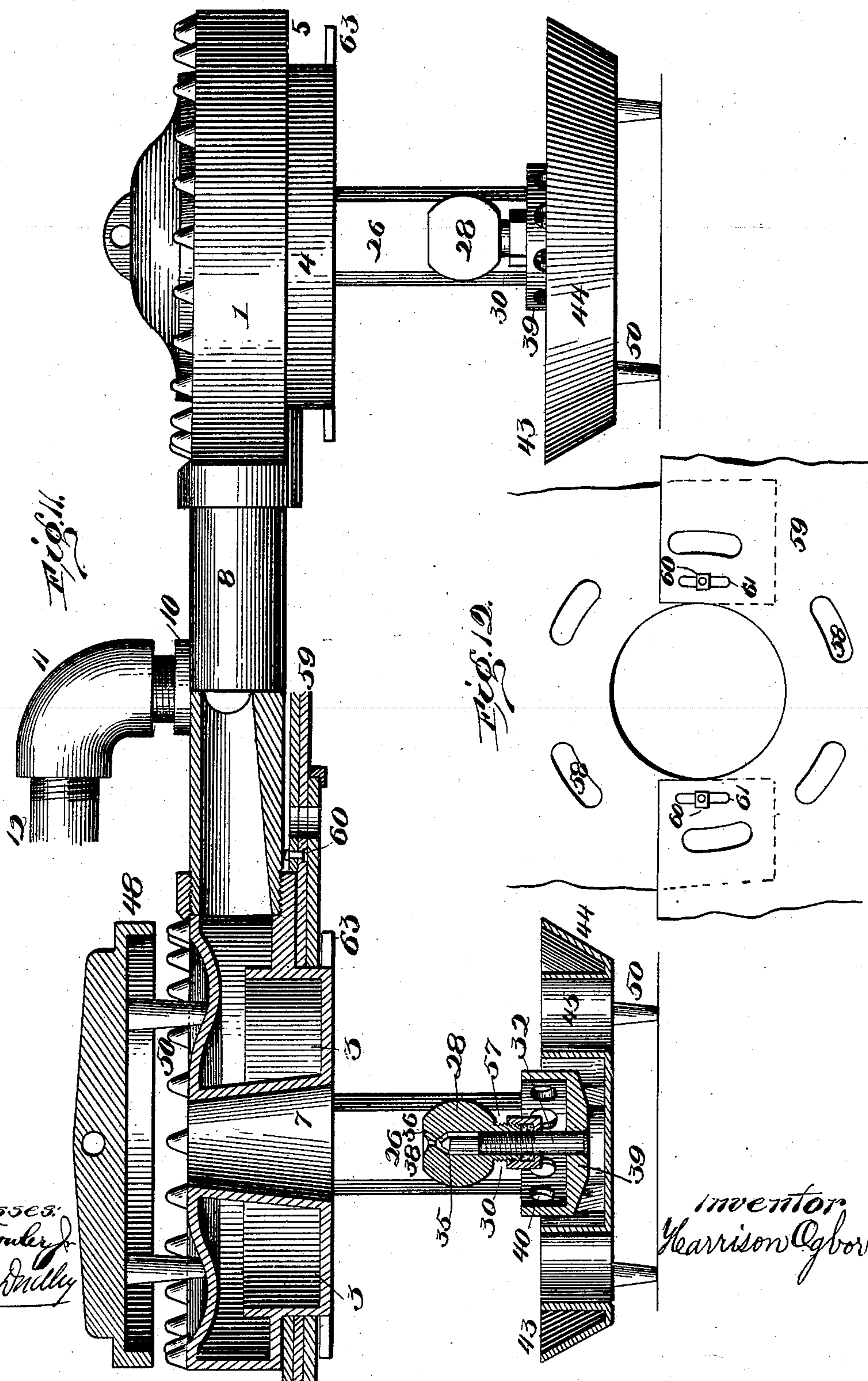
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

HARRISON OGBORN, OF INDIANAPOLIS, INDIANA.

## BURNER FOR HYDROCARBON LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 624,372, dated May 2, 1899.

Application filed August 1, 1898. Serial No. 687,382. (No model.)

*To all whom it may concern:*

Be it known that I, HARRISON OGBORN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Burners for Hydrocarbon Liquids; and I do declare the following to be a full, clear, and exact description of the invention, such as 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 figures of reference marked thereon, which form a part of this specification.

My invention relates to hydrocarbon-gas generators and burners.

Heretofore many unsuccessful efforts have been made to produce hydrocarbon gas, for domestic and other purposes, from oil and other substances and burn it at the same time without waste of unconsumed products of combustion. Great difficulty has been found in the construction and operation of burners for quickly heating the retort by the initial fire and the vapor in the retort to insure perfect combustion, to thereafter discharge the vapor under pressure, to distribute the heat produced where desired, prevent waste, and maintain a clear moderate fire when the oil-supply is turned low, and also to prevent the fire smoking and becoming extinguished. Great difficulty has likewise been found in regulating the oil-supply to the retort and in controlling the exit of the vapor therefrom, so as to secure the union of sufficient oxygen with it to make an inflammable heating-gas, and thus insure perfect combustion as it issues into the open air to be burned, and in tempering the humidity of the vapor, so as to prevent the filling up of the retort, pipes, and nipple with the chemical and mechanical impurities of the oil and yet to obtain a vapor sufficiently heated and rarefied to be ready to burst into a true gas as it issues from the generators, and in making a burner operate successfully in open stoves, grates, and furnaces; also, in preventing the escape of the vapor under pressure in the retort through the oil-supply pipe, and thus defeating the objects sought; also, in preventing the upward flow of a volume of cold air around the retort and through the stove, thereby cooling them,

and in securing the union of a sufficient amount of air with the vapor to insure perfect combustion of the same when burning. Nearly all burners fail to make true gas and simply burn oil or vapor, by either of which modes a large part of the units of heat in the fuel escape unconsumed in the form of gas-vapor, smoke, soot, and other waste products.

The objects of my invention in hydrocarbon-gas generators and burners are to overcome the foregoing and other imperfections in the same by making a liquid-fuel-gas generator and burner of simple, compact, and inexpensive construction, which is practical and efficient in operation and well adapted to cooking and heating stoves, open grates, furnaces, and other purposes, and by dividing the stove fire-box with a horizontal partition.

A feature of my invention consists in effecting a great saving in fuel by increasing the amount of air and oxygen passing through the mixing-chamber and preventing a column of cold air passing through the stove and around the retort, and thus greatly cooling them; also, in converting oil and other substances automatically and continuously during the operation into hot vapor and compressing it at the same time in connection with means by which the hot compressed vapor is caused to issue through restricted openings in forceful jets from the retort, passing through a mixing-chamber into a gas-burner cap, and is caused to issue therefrom in thin jets into the open air, where it commingles with the air, becomes true gas, and is burned with intense heat and complete combustion the instant it reaches the open air, thus forming a complete process and a new article of manufacture.

With these objects in view the invention consists in the parts and combination of parts herein described in the claims.

Like figures indicate corresponding parts in the different drawings.

Figure 1 is a perspective view of a burner adapted to cook-stoves; Fig. 2, a vertical section of a retort and attachments; Fig. 3, a top view of the same and ventilators around the retort; Fig. 4, a vertical sectional view of the gas-burner cap with dotted lines showing top of retort; Fig. 5, a modification of adjusting-nut; Fig. 6, a view of heating-cap in-



verted; Fig. 7, a top view of oil-cup, lug, and ventilators; Fig. 8, an enlarged sectional view of ball-valve and oil-pipe shown in elevation in Fig. 9; Fig. 9, a detail view of oil-can-sup-  
 5 porting standard and connections; Fig. 10, a ventilator-cover in oil-cup; Fig. 11, a vertical section of one burner and an elevation of another; Fig. 12, a plan view of cut-off, adjustable plates, and their connections.

10 These retorts are cast integral, the cores for the same being supported at 52 53 53 in the holes in the retorts now filled by pipe 8 and plugs 56 56, thus making the retorts gas-tight to retain the vapor under pressure.

15 These retorts each consist of the annular hollow chamber 3, with a bottom 4 5. At the center part 4 is formed a vertical mixing-chamber 7, usually straight on its sides, preferably tapering inward toward the top, as  
 20 shown in Fig. 2. Inside of the retorts are formed annular grooves 6 6, surrounding the retorts, which catch and hold the oil that produces the initial fire, also that to be vaporized afterward. These grooves should be  
 25 made shallow and as near the top of the retort as possible, so as to be in close contact with the flame, and thus be kept hot when only a moderate fire is burning.

The bottom of the retort is of unequal  
 30 height, with the outside raised part forming the bottom of groove 6. By this arrangement not only is there provided a more extended heating-surface in the interior of the retort, but the capacity of the overflow-chamber is  
 35 largely increased over that of the receiving-chamber. The connecting-pipe 8 on the inside is made higher in the middle than at the ends, so that the oil coming into it quickly passes out of it into grooves 6 6 and is in-  
 40 stantly vaporized, and has a hollow projection 9, with a raised vertical lug 10, into which is secured elbow 11, so it can be turned in various positions horizontally to accommodate  
 45 pipe connections from different directions. Into the horizontal part of this elbow is secured the oil-pipe 12, (shown broken off,) which extends in use a short distance outside of the stove, on which stop-cock 13 is located, and below that the check ball-valve 14, which  
 50 prevents the escape of the vapor from the retort through the oil-pipe 12, and below this the U connection, and above that the oil-pipe 15 and tank 16, which is supported and held in position by standard 53 in sockets 51  
 55 and 54.

The ball-valve may be made by forming seats on the ends of adjacent pipes and uniting them together by a union, the inside of which is long and wide enough for the ball to  
 60 freely play vertically and for the oil to pass on its way to the retort. The oil readily raises the ball 14 in its passage, but when the vapor under pressure from the retort attempts to escape through the oil-pipe it in-  
 65 stantly forces the ball down, closes the outlet, and prevents its escape. As soon as the pressure in the retort is relieved by the escape of

the vapor through the nipple the regular flow of oil is resumed.

On the top of the retort is an annular de-  
 70 pression 17, on which are lugs 18 for centering and seating the circular-toothed gas-burner cap 19. This cap is made, as shown in Figs. 3, 4, and 11, having a curved top, with sides preferably about one-half of an inch high, with  
 75 a dependent point 21 in its center to guide the gas toward the outlets when in active transit.

The slots 22 in the vertical sides of gas-burner cap 19 are made very thin, so as to force the gas to issue through them in thin  
 80 sheets to insure complete combustion.

At equal distances apart on the rim of cap 19 are supporting-teeth 23, made a little longer than the others and resting on the retort, holding up the cap, and leaving an open space  
 85 20, Fig. 4, between the bottom of the cap 19 and top of retort 1, through which the gas escapes. The spaces at the ends of the teeth are widened to allow still more gas to escape in contact with the retort to assist in heating  
 90 it. All openings in the cap are small and thin to bring the gas issuing therefrom in actual contact with the oxygen of the air to effect perfect combustion. Another object is to prevent the vapor taking fire and carrying  
 95 the flame to the nipple and burning the vapor there before it reaches the mixing-chamber and becomes converted into gas. These flames, and especially those produced by the gas passing under the gas-burner cap 19,  
 100 strike the top of the retort 1, rib 24, and lugs 25 and carry the heat from the flames to the vapor-generating groove 6. On the lower bottom 4 of the retort is cast or otherwise attached a dependent pipe 26, the inside bot-  
 105 tom part 57 of which is a trap to catch impurities in the oil. In the side toward the center of the retort valve-support 28 is secured, having horizontal tube 29 and vertical tube 31, which is tapped out for stem 32, which  
 110 has a screw on it for part of its length. (See Fig. 2.) By this structure of retort the vapor is gradually heated and the deposition of carbon is largely prevented. Another part is made smooth, around which the packing-box  
 115 32 engages to prevent the vapor's escape. This box is adjusted and held in position by a threaded hole in its center working on the threaded outside of lug 30. Another part of the stem 32 is reduced in size to allow oil and  
 120 vapor to pass around it. Part 34 is tapered to fit the valve-seat 35, the stem is made flat on the end 36, and the bevel-seat extends a short distance above it, leaving a space between it and the upper end of the stem. Above this is  
 125 exit-orifice 37, preferably about one twenty-fifth of an inch long and the diameter of a number sixty-eight drill to restrict and direct the vapor. This hole is so short that impuri-  
 130 ties in the vapor cannot collect and adhere to its sides, but are blown through and out of it, whereas if it was a long tube the impurities would adhere to its sides, fill it up, and stop the flow of the vapor. Above this is a



countersink 38 to make a smooth outlet for the vapor and guide for the cleaning-wire should the outlet ever need cleaning. On the lower end of this stem is hand-wheel 39, with  
 5 holes 40 in its side, affording overflow-passages for oil from the recess in said hand-wheel to the heating oil-cup. By means of this hand-wheel needle-valve is adjusted and the flow of vapor controlled.

10 At a proper distance below the retort is placed the heating oil-cup 44. This cup has legs 50 to support it and admit air under it. On its top is lug 42 with a screw-hole through it, which rests against the lower end of pipe  
 15 26, which has a threaded hole, not clear through, in its bottom for the reception of a screw that unites it and the oil-cup together. This cup has raised sides 43 with bottom perforated for ventilation and has tubes 45 surrounding them. Above these tubes are placed  
 20 caps 46, wider on top than the holes, with supports 47 to hold them above the tops of the tubes, so the air may be delivered in horizontal sheets to the flames and yet prevent the oil  
 25 passing through the tubes 45.

48 is a heating-plate, (shown inverted in Fig. 6 and in working position in Fig. 11,) formed of a solid top dependent rim 49 and legs 50, which is used only in making the initial fire.

30 Immediately under bottom 5 and extending to the part 4 and supported on lugs 63 are plates 59, made in two parts to permit of their attachment and adjustable by bolts 60 and slots 61 in the plate near the retorts. In these  
 35 plates are ventilator-holes 58, which are opened and closed by circular sliding perforated plate 62. These ventilators are opened in the initial fire and closed when the oil is burned out of oil-cup 44. These plates cut  
 40 the fire-box of the stove into two parts and when open allow the flame to pass upward in contact with the retort and when closed prevent a column of cold air from passing up around the retorts and through the stove and  
 45 chimney and cooling them and assist the vapor from the retort in forcing a larger volume of air into the combustion-chamber. By reason of the draft of the chimney by the use  
 50 of the cut-off all the air used must pass through the combustion-chamber and gas-burner cap and produce thorough combustion of the gas, greater heat in the stove, and a deeper richer purple flame with a contracted damper and less consumption of fuel.

55 The operation of my invention is as follows: The retort being properly placed in the stove and connections made, when air-pressure is to be used the tank 16 is filled not over two-thirds full of oil and made air-tight, with  
 60 proper appliances for the introduction of air under pressure sufficient to force the oil into the retort whether it be placed above or below the stove; but when the force of gravity is used the oil descends the pipe 15, traverses the U  
 65 connection, ascends pipe 33, raises the ball 14, and passes through the stop-cock 13, pipe 12, and elbow 11 into pipe 9 and 8 and then sep-

arates, part of it passing through incline pipes to each retort. They being on a level, the oil is allowed to flow until it fills grooves 70  
 6 6 and runs over their sides, when it passes down pipes 26 29 and through the needle-valve outlet and into oil-cup 44 and saturates the asbestos wick 51. Then the supply of oil is cut  
 off, the heating-cap 48 placed in position, and 75 the wick and oil in the cup set on fire, thus making the initial fire for heating the retort, the smoke of which is reduced to a low point by the construction of the ventilator oil-cup. The oil in the cup and groove 6 should be ex- 80  
 hausted about the same time. When the wick and oil in the cup are set on fire, they quickly heat the bottom of the retort and needle-valve, which vaporize the oil in them and it at once begins to issue from the nipple 85  
 37. This vapor takes fire from that in the oil-pan and passes through the mixing-chamber in the retort and strikes the under side of heating-cap 48 and is deflected horizontally  
 between it and the retort until it strikes the 90 flange of the cap 48, where it is deflected downward around the retort and becomes the principal agent in heating the retort, while the flames from the oil-cup pass through circular  
 ventilators and mixing-chamber and assist in 95 heating the retort and stove. The oil in the grooves and pan being exhausted, the heating-cap 48 is taken off, and if the retort is well heated the vapor will blow out the fire. I  
 then place gas-burner cap 19 in position and 100 touch the issuing vapor with a light and instantly the vapor is converted into gas as it issues from the slots in gas-burner cap 19; takes fire, and burns entirely outside of the  
 gas-burner cap as it escapes therefrom, being 105 a bluish-green color next to the cap and beyond that a deep purple mixed with violet.

If the retort is not well heated, the vapor may continue to burn at the nipple after the gas-burner cap is in place. In that case I 110 cut the vapor-flame near the nipple with a case-knife or its equivalent, when the flame springs to the top of the retort outside of the gas-burner cap and burns the gas as it issues into the open air, as heretofore described, 115 with a strong, steady, beautiful, hot, odorless, smokeless flame and almost without noise or light.

The slight changes necessary to apply my invention to portable stoves and other forms 120 of heating-stoves requiring one retort in place of two and the means of using it in open grates and furnaces are so obvious that I deem it unnecessary to set them forth in detail. 125

I claim as my invention—

1. In a burner for hydrocarbon liquids, a retort having a central tapered passage providing a mixing-chamber, and an annular flange within the retort dividing the same 130 into an oil-receiving chamber and an oil-overflow chamber, the depth of the latter chamber being in excess of the receiving-chamber, an inlet at the receiving-chamber and an out-



let at the overflow-chamber, substantially as described.

2. In a burner for hydrocarbon liquids, the combination with a vapor-tube having its lower portion interiorly threaded, and having at its upper end a restricted passage a portion of which is of cylindrical form and is outwardly flared beyond said cylindrical portion, a conical valve-seat below said passage, and a valve having a threaded portion engaging the threads in the tube, the remaining portion of the valve being of smaller diameter than the tube-aperture, and terminating in a truncated cone, substantially as described.

3. In a burner for hydrocarbon liquids, the combination with a retort having a central passage providing a mixing-chamber, of a burner-cap removably supported on the retort, having at its outer edge a plurality of teeth the ends of which are pointed, certain of the teeth being of relatively greater length than the remainder, substantially as and for the purpose set forth.

4. In a burner for hydrocarbon liquids, a retort, a vapor-tube leading from the retort, a valve for the tube, a hand-wheel on the valve-stem recessed in its upper end and provided with side openings, a cup below the tube having a plurality of flanged openings, and caps removably placed over said openings, substantially as described.

5. In a burner for hydrocarbon liquids, the combination with a retort having a plurality of lugs, a plate supported by said lugs having a plurality of slots the walls of which are concentric to the wall of the retort, and an

annular ring-plate similarly slotted and supported on the aforesaid plate, and adapted to be moved to bring the slots of the two plates into or out of register, substantially as and for the purpose set forth.

6. In a burner for hydrocarbon liquids, the combination with a retort, of a cup adapted to receive oil for the initial vaporization, said cup having a plurality of flanged openings, and caps removably secured over said openings to shield them and distribute the air in horizontal sheets to the flames.

7. In a burner for hydrocarbon liquids, the combination with a retort, of a cup adapted to receive oil for the initial vaporization of the liquid, said cup having a plurality of flanged openings, caps having spring-fingers adapted to be temporarily placed over the flanged openings, removable caps for said openings, and wicking wrapped around the said flanges, substantially as described.

8. In a burner for hydrocarbon liquids, a retort having at its upper edge a plurality of integral lugs spaced apart and having an annular depression in its top, a burner-cap slotted at its edge and adapted to be removably placed on said top, and lugs on the top for positioning said cap, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HARRISON OGBORN.

Witnesses:

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