

No. 662,276.

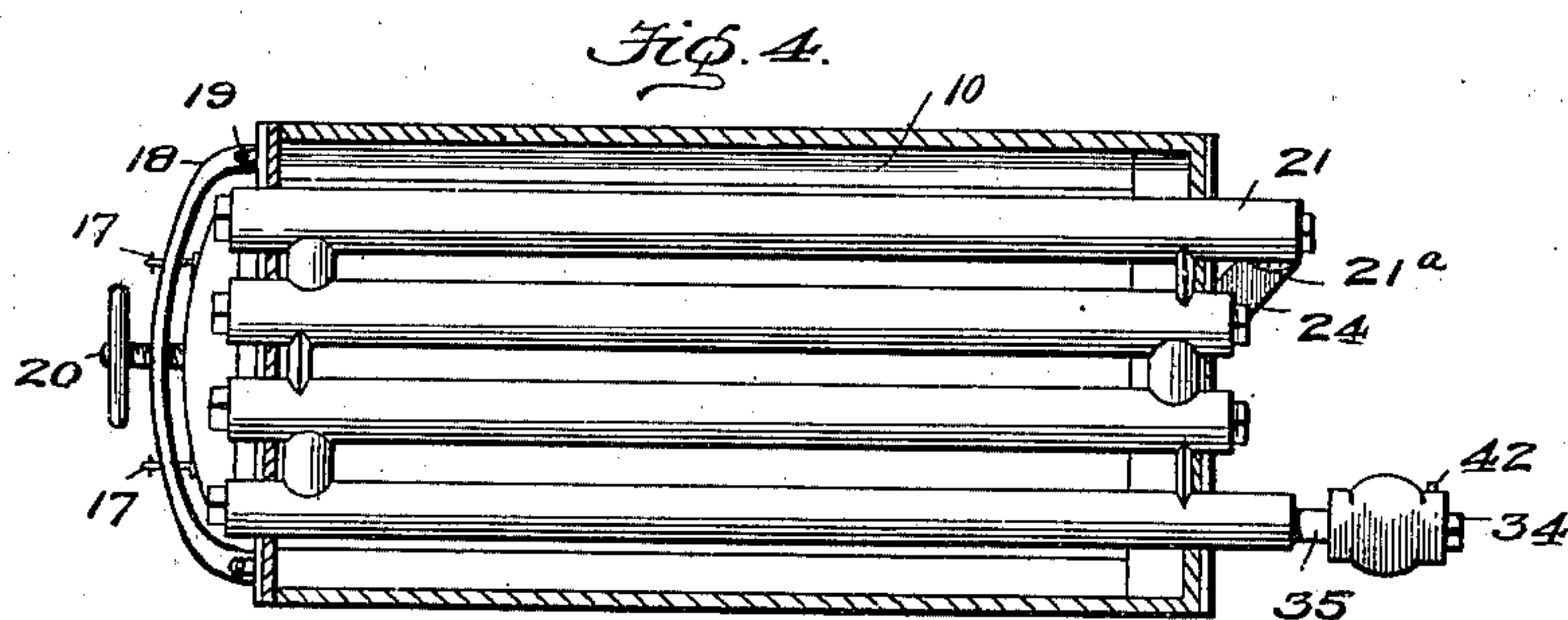
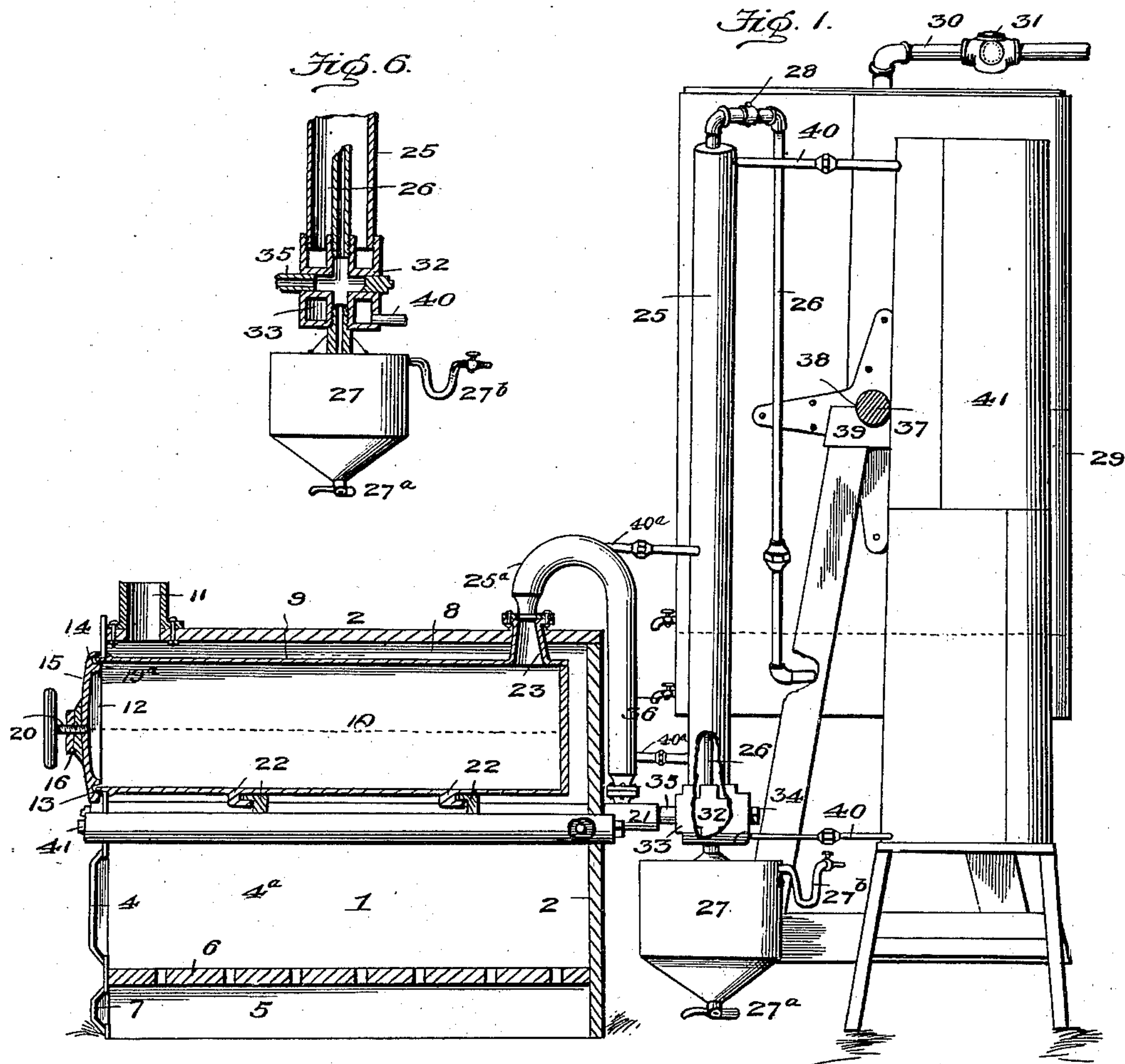
Patented Nov. 20, 1900.

J. F. KISTLER.
GAS GENERATING MACHINE.

(Application filed Feb. 28, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

[Signature]
[Signature]

Inventor

— J. F. Kistler —

— by — David P. Moore.

— Atty —

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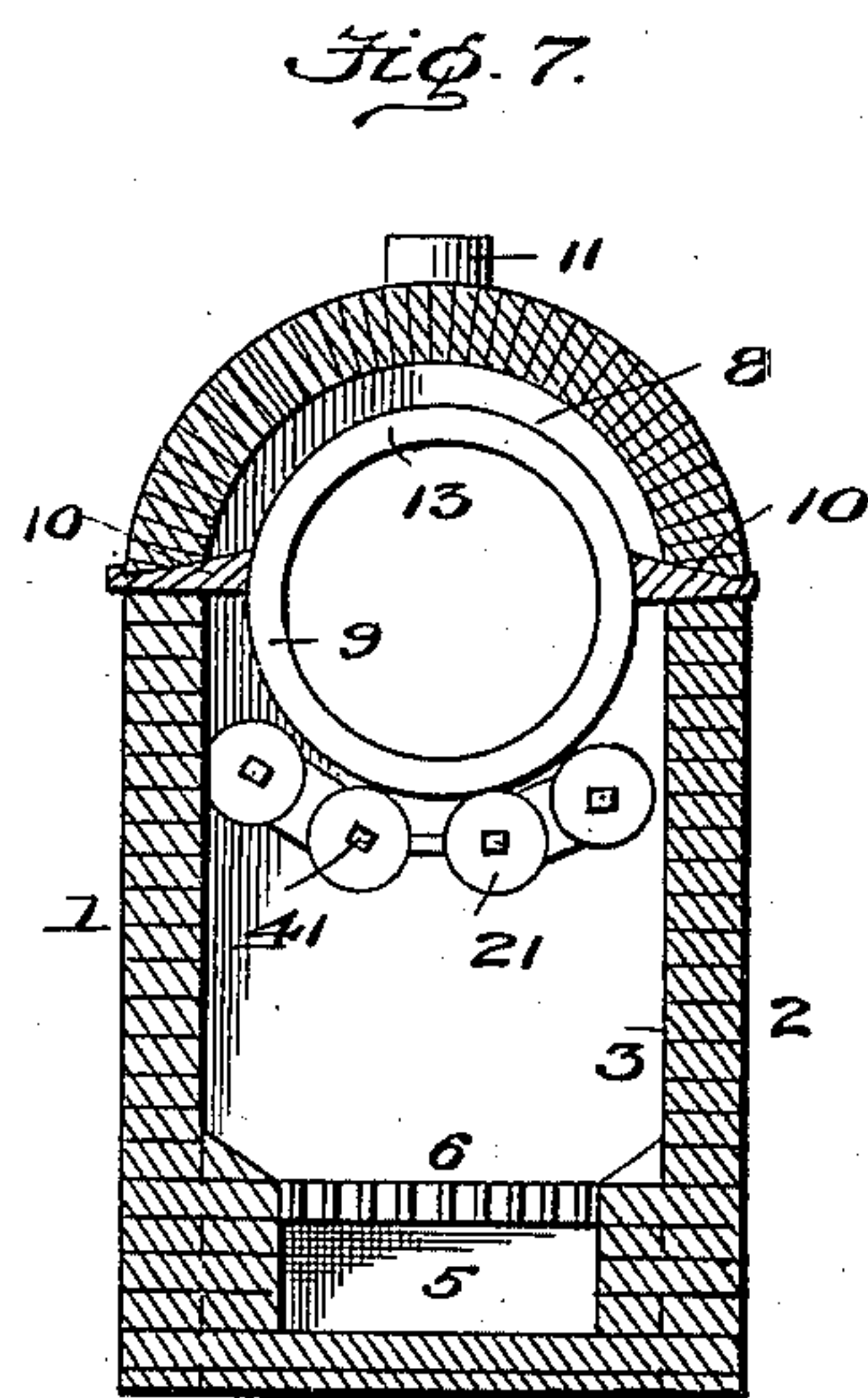
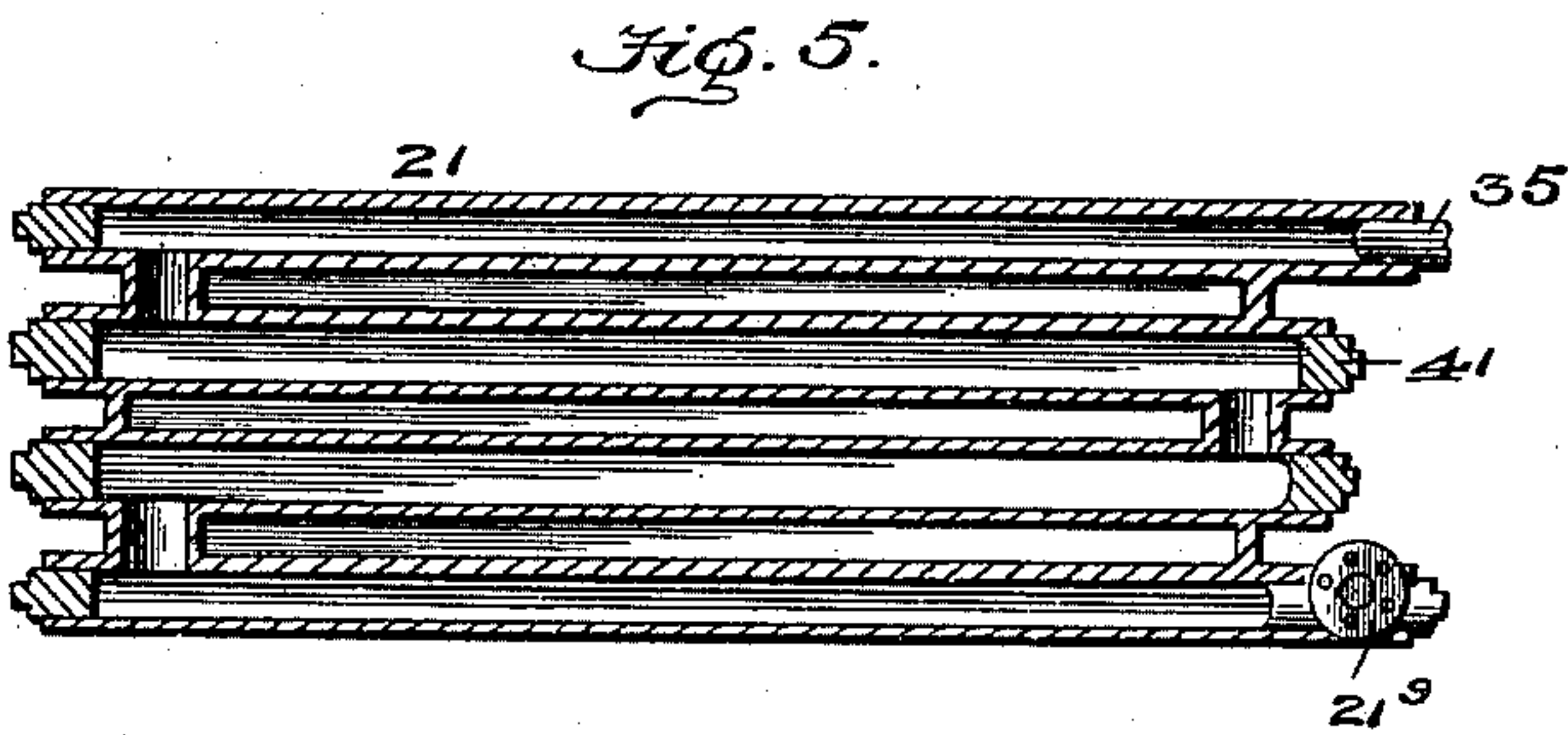
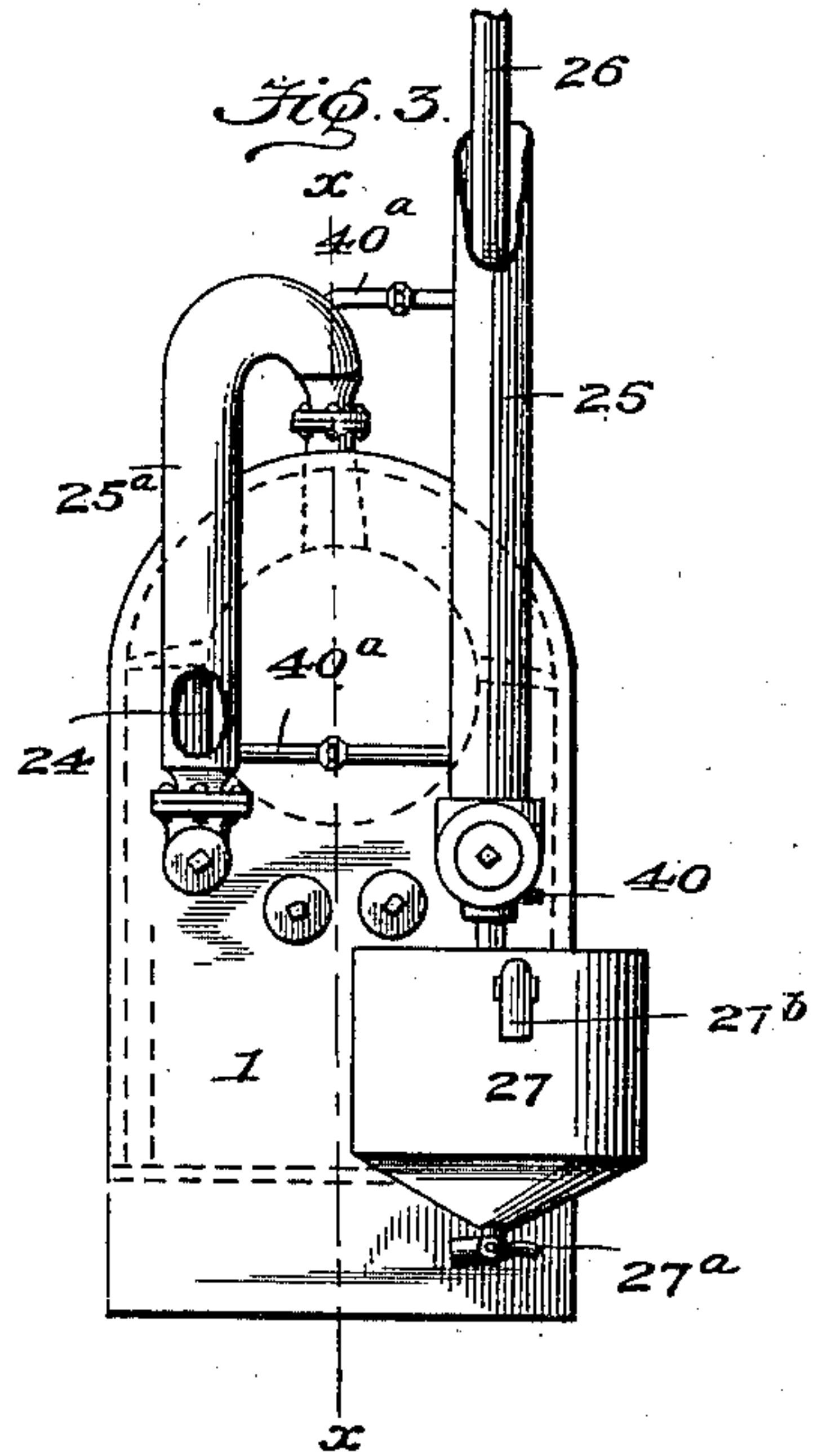
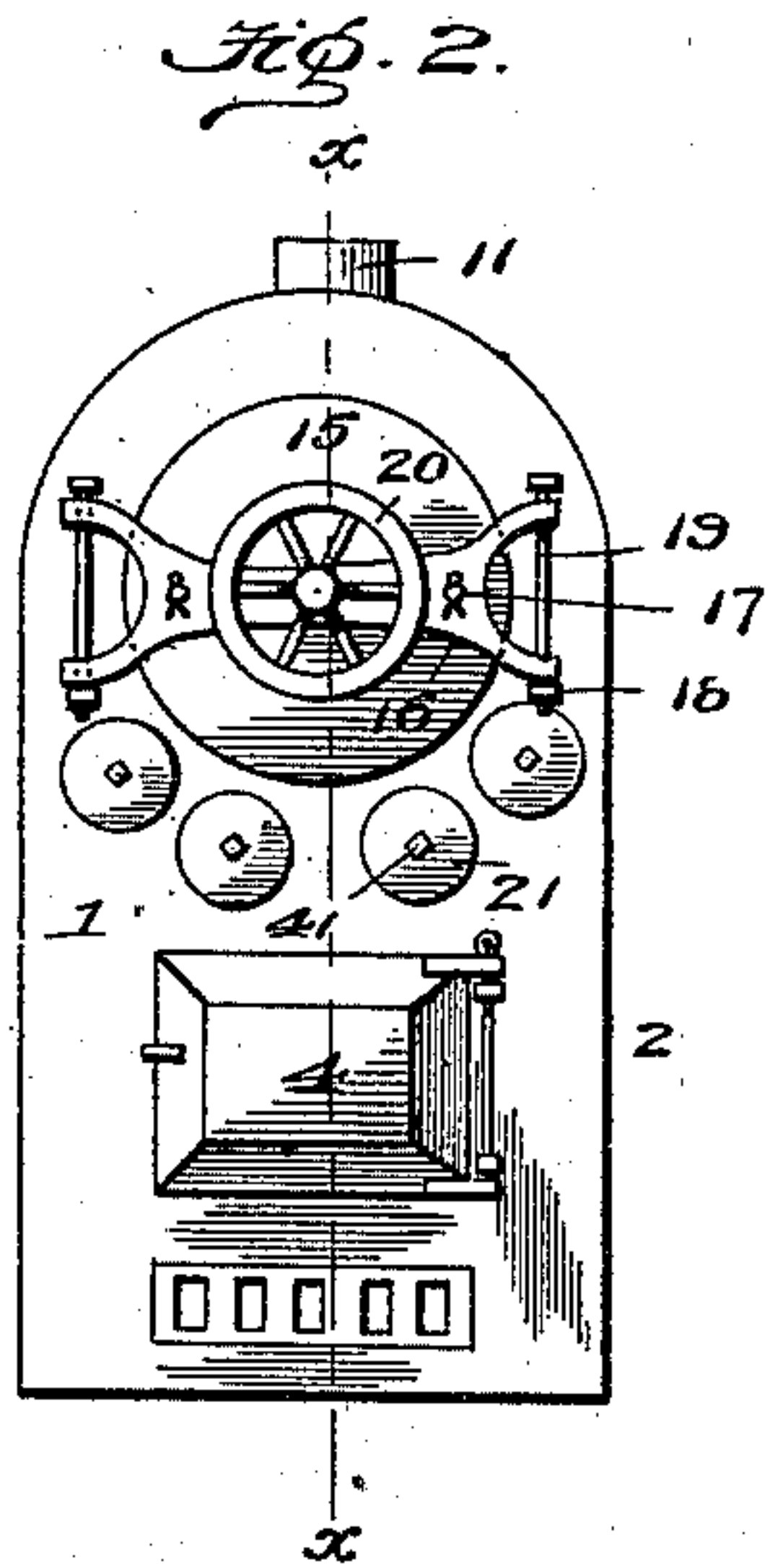
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(No Model.)

2 Sheets—Sheet 2.



Witnesses:

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J. H. Cummins

Inventor
J. F. Kistler
- By - David P. Moore.
Atty.

UNITED STATES PATENT OFFICE.

JOHN F. KISTLER, OF TACOMA, WASHINGTON, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE HYDROCARBON GAS COMPANY, OF SAME PLACE.

GAS-GENERATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 662,276, dated November 20, 1900.

Application filed February 28, 1900. Serial No. 6,849. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. KISTLER, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Gas-Machines, of which the following is a specification.

My invention relates to improvements in wood-gas machines, and is especially adapted to obtain from wood and its residues—tar, resin, &c., or other vegetable-matter—a highly inflammable gas for lighting and heating purposes, leaving a strong solution of creosote, carbolic acid, wood-alcohol, &c., which may also be utilized.

The main object of my invention is to provide a gas-machine in which the wood or other substances is subjected to a degree of heat sufficient to extract all the gas-containing substances, leaving a charcoal of the finest quality, the gas, together with its residue, being caused to flow from the retort through a condenser into a system of auxiliary retorts or superheaters, where all the gaseous elements are converted into a fixed gas and thence through a condenser, where the impurities in the form of vapors are condensed and separated from the gas and are precipitated by gravitation into a suitable receptacle or cistern provided to receive them, the gas passing onto the purifier and thence to a storage-tank.

Another object of my invention is the provision of a gas-machine which is very simple and durable, and with the addition of my system of condensers, combined with improvements in construction of retorts and furnace, I am able to obtain the greatest amount of gas from the wood or other substances and overcome with my condensers the difficulties experienced in operating other machines—viz., the stopping of the pipe leading from the machine to the purifier caused by said pipe becoming sufficiently heated by the passage of the hot gas, causing the impurities to adhere to and finally clog the pipe entirely.

To attain the desired objects, my invention consists of a gas-machine embodying novel

features of construction and combination of parts, substantially as disclosed herein.

In the drawings, Figure 1 is a horizontal central sectional view of the furnace, the retorts and condensers being in elevation, section taken on line *x x* of Figs. 2 and 3. Fig. 2 is a front elevation, showing the retort-door and yoke which holds it in place, the furnace and draft doors, and end of the small retorts or superheaters. Fig. 3 is a rear end elevation, showing rear end of small retorts and condensers and their connections. Fig. 4 is a view of retorts looking upward. Fig. 5 is a top sectional view of small retorts. Fig. 6 is a detached sectional view of the four-way cross and its connections. Fig. 7 is a front end view of the large and small retorts and grates in a brick casing, showing flange 10.

Referring by numerals to the drawings, the numeral 1 designates the furnace, which is iron lined with asbestos 2 or built of brick 3, provided with fire-box 4^a and door 4 and ash-pit 5, with grate 6 and draft-door 7.

In the upper portion or dome 8 of the furnace and not extending the full length thereof is the cylindrical retort 9, provided with ribs or flanges 10 to hold the retort within the furnace securely and to form a partition, causing the heat to pass to the rear end of the furnace and thence upward, around, and returning over the top of the retort to the flue 11. In this retort is placed the wood or other material through the mouth 12, provided with rim or flange 13, which is adapted to enter the groove or slot 14 of the domed cap or cover 15, which is held in place by the yoke 16, to which it is suspended by eyed pins 17, said pins being securely fastened in said cover and passing loosely through the yoke and provided with split keys at the outer ends. The yoke is swingingly connected to lugs 18 of the furnace-front by means of pins 19, and by removing one of said pins 19 the other forms a hinge, and thus the yoke 16, together with the domed cap or retort-door 15, can be swung open either right or left. An asbestos ring or gasket 19^a fits into groove or slot 14 of the cover, which when the yoke is swung into

place closes the mouth of the retort. Then the screw 20 is used to force the cover, with its gasket, firmly against the flanges of the retort, making a gas-tight joint.

5 My apparatus is so arranged that the heated products of combustion pass up through and around the small retorts or superheaters 21 to the rear of the furnace, and thence up around the rear end, and returning over the top of
10 large retort 9 to flue connection 11, said small retorts 21 being suspended in the furnace by means of hook-lugs 22, cast to both small and large retorts, and the small retort's ends resting on front and rear ends of the furnace;
15 but said superheaters 21 may be put in any other position in furnace without departing from the spirit of my invention. On top and near the rear end of the large retort is the exit 23, to which is connected the pipe 24,
20 which is surrounded by a water-jacket 25^a, making a condenser of it. Said pipe or condenser connects at the lower end with the rear end of the superheater at flange 21^a. The superheaters 21, Fig. 5, are so constructed as
25 to form a continuous passage for the gas through the hottest part of the furnace, converting it into a fixed gas, and thence leaving the retorts it enters the condenser 25, which condenses and separates the vapors
30 and other impurities from the gas, depositing the same by gravitation into a liquid or residue receptacle 27, allowing the gas to pass on through pipe 26 and check-valve 28 into the purifying-tank 29, and thence through pipe 30
35 and check-valve 31 to gas-holder at lower end. Forming a part of the condenser is the "four-way" coupling 32, incased by the jacket-coupling 33 of the cooler or condenser 25. To the lower member of the coupling is connected
40 the liquid or residue receptacle or reservoir 27, provided with the cocks 27^a and 27^b for removing the liquid therefrom. The outer member is closed by a plug 34, which can be removed to clean out the coupling and pipe se-
45 cured to the upper member, and extending through the cooler or condenser is the vertical gas-conducting pipe 26, the inner member being connected directly to the end of the superheater by means of the nipple 35. In
50 order that the impurities may be taken from the purifying-tank 29, use the cock 36. This tank 29 is provided with trunnions 37, which are journaled in the bearings 38 of the supporting-frame 39. Connecting with the up-
55 per and lower end of the cooler or condensers 25 are the water-conducting pipes 40, which are connected to a circulating-tank 41 in this case; but any water-supply may be employed without departing from the spirit of my in-
60 vention. Also condenser 25^a is connected to condenser 25 by circulating-pipes 40^a or may be connected independently.

From this description, taken in connection with the drawings, the operation of my machine will be readily understood and its numerous advantages fully appreciated; but the

operation, briefly stated, is as follows: The fire is made in the furnace and the cap or cover 15 removed from the retort 9 by swinging the hinged yoke 16. The wood is then
70 placed into retort 9 and the cover or door closed and sealed by means of the asbestos gasket against the flange on the retort by means of the screw 20. The heat causes the wood to
75 throw off all the gas-containing substances, which pass into the superheaters, where it becomes a fixed gas, passing thence into the condenser proper, where the gas is cooled, and the vapors and other impurities are condensed
80 and precipitated into the receptacle adapted to receive them, the gas going direct to the purifier and thence to the storage-tank. The purifier is made to swing or tilt, so the impurities and purifying material may be easily
85 removed therefrom. I would have it understood that the pipes of the auxiliary retort may have solid cast gas passage-ways near their alternate ends inside of the furnace, or they may be cast separate and joined by suitable connections outside of the furnace. In
90 either case they are provided with the plugs 41 for cleaning out.

It is evident that I provide a very simple, durable, and inexpensive gas-machine and one which is very efficient and practical and
95 economical in use.

I claim—

1. In a gas-machine, the combination of a furnace, a main retort and an auxiliary retort located one above the other in the fur-
100 nace, a four-way coupling connected to said auxiliary retort, a liquid-receptacle connected to the lower member of the coupling, a clean-out plug in the member opposite the retort member, a gas-conducting pipe con-
105 nected to the upper member, a cooler or condenser surrounding said coupling and the conducting-pipe, means for supplying water to said cooler, and a purifying-tank connected to said conducting-pipe.

2. In a gas-machine, the combination of a furnace, a cylindrical retort located in the dome thereof, an auxiliary retort located below and partially supported by the other re-
115 tort, a curved pipe connected to both retorts and causing communication therebetween, a coupling connected to the discharge end of said auxiliary retort, a liquid-receptacle also connected to said coupling, a removable plug for allowing the coupling to be cleaned, a gas-
120 conducting pipe connected to said coupling, a cooling-jacket surrounding the conducting-pipe, means for supplying water to the cooling-jacket, and means for purifying the gas.

3. In a gas-machine, the combination of a
125 furnace provided with a dome having a flue in its forward top end, a cylindrical retort located in the dome but not extending the full length of the furnace, wings formed upon said retort to support the same and cause the heat
130 to pass around the retort, cleats formed upon the lower side of the retort, a series of hori-

zontal pipes forming a continuous passage
communicating with and below said retort,
cleats carried by said pipes to engage the
cleats of the cylindrical retort, a gas-conduc-
5 tor connected to one of said pipes, means for
cooling the gas surrounding said conductor,
and a purifier connected with the conductor.

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

JOHN F. KISTLER.

Witnesses:

R. D. CAMPBELL,
A. R. HEILIG.