

Model.)

2 Sheets—Sheet 1.

J. W. TALLMADGE.

APPARATUS FOR THE MANUFACTURE OF HYDROGEN GAS.

No. 452,246.

Patented May 12, 1891.

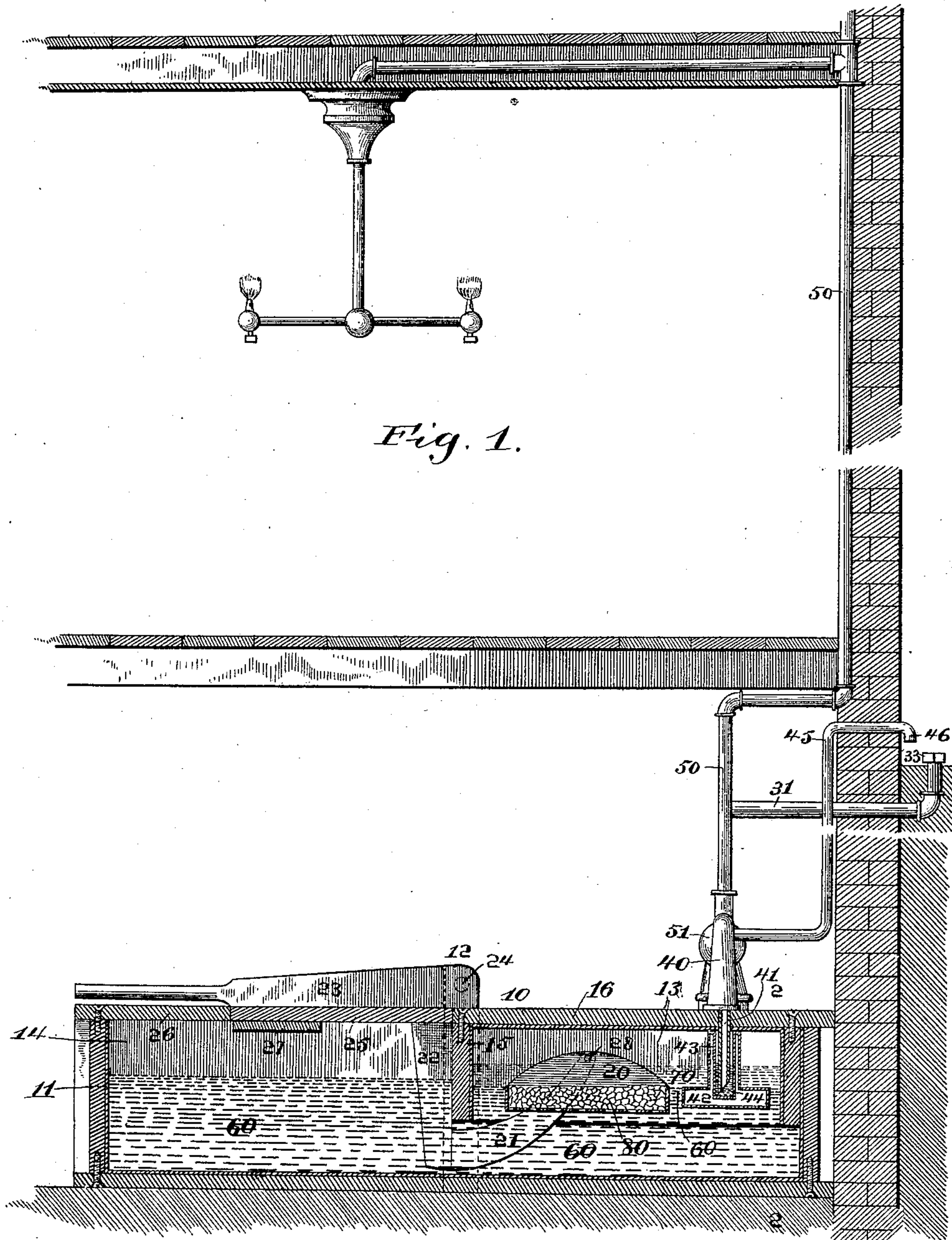


Fig. 1.

Witnesses:

J. B. McGirr.

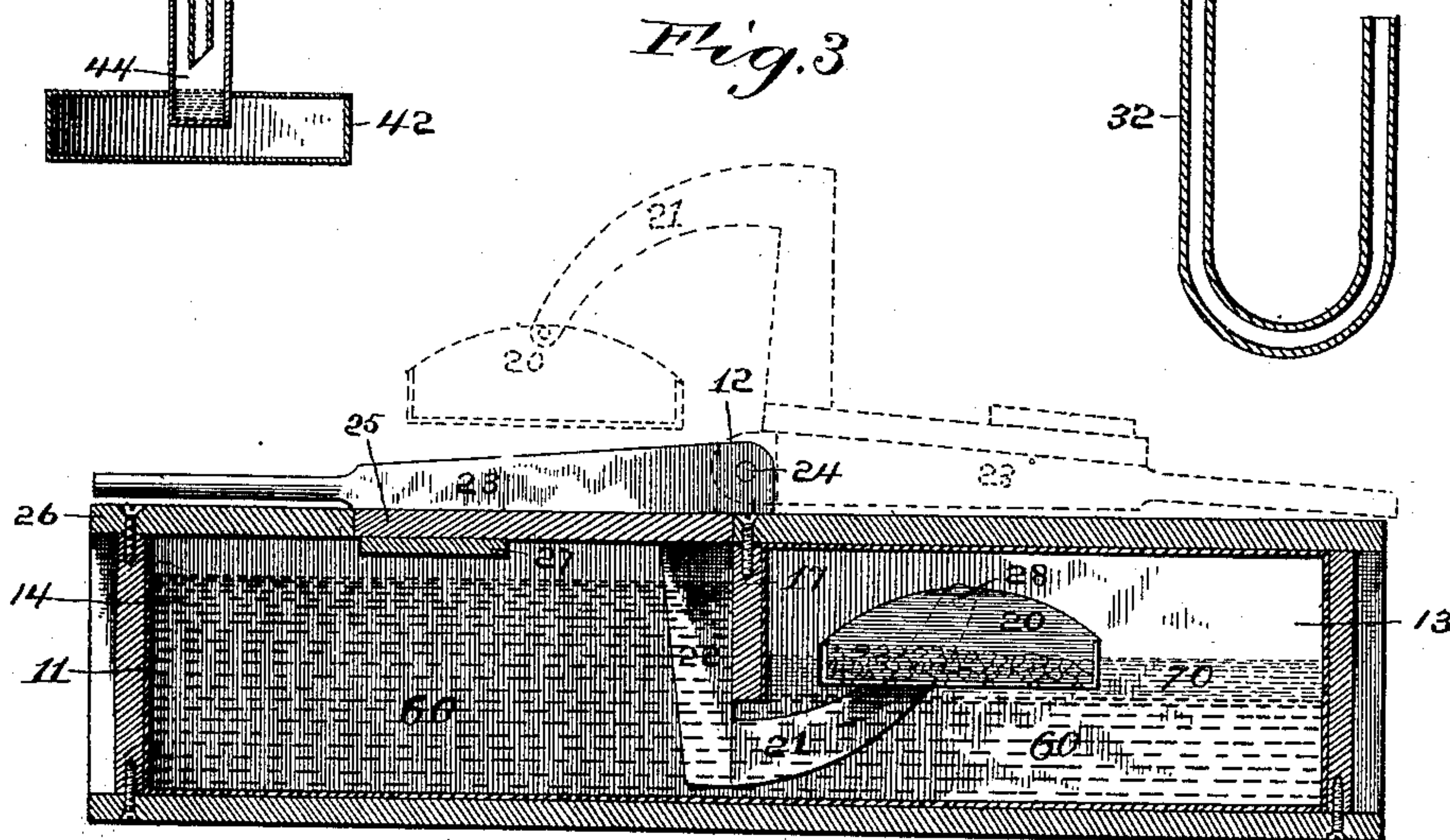
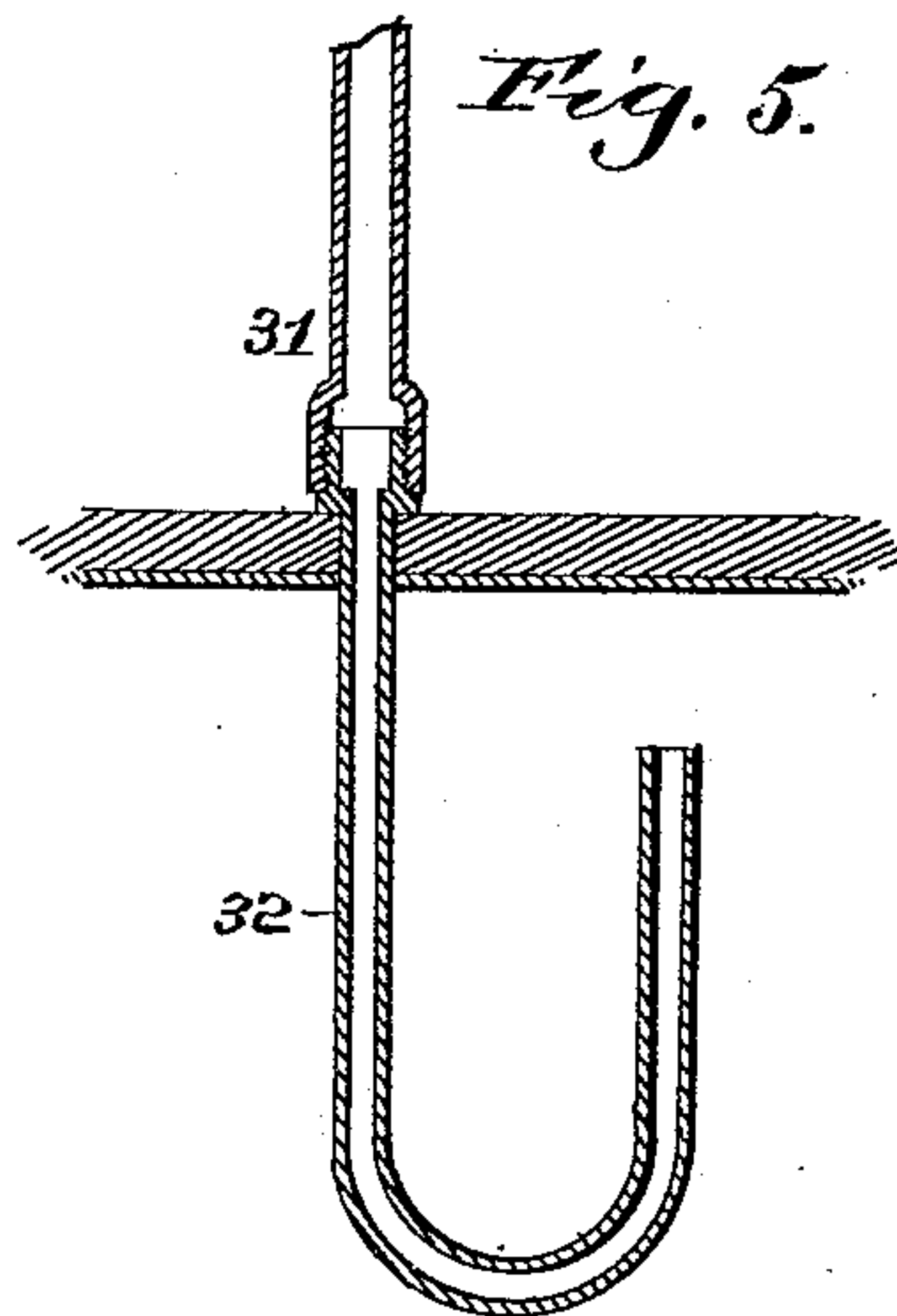
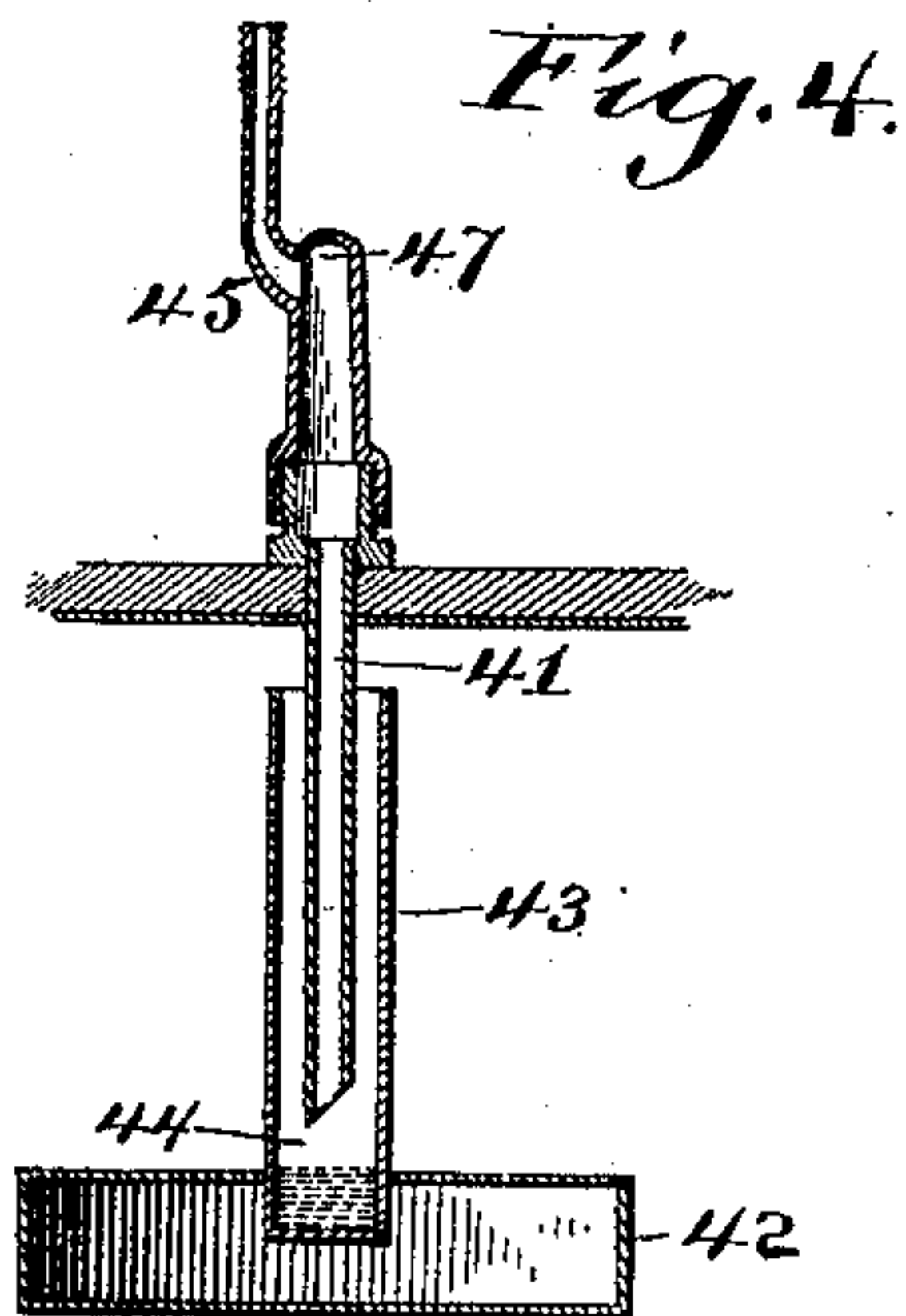
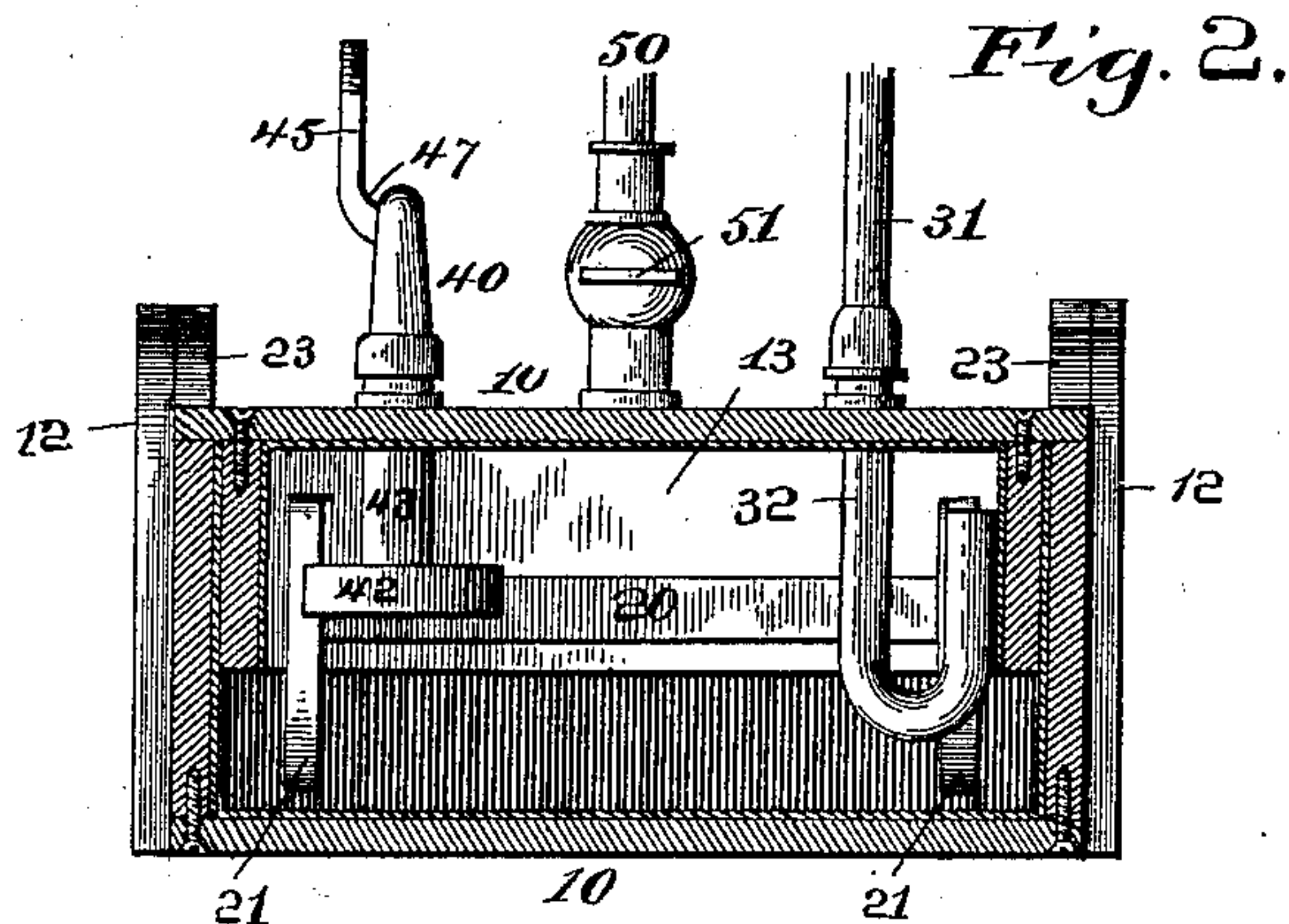
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UNITED STATES PATENT OFFICE.

JAMES WINANTS TALLMADGE, OF ALBANY, ASSIGNOR TO THE ELECTRIC
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APPARATUS FOR THE MANUFACTURE OF HYDROGEN GAS.

SPECIFICATION forming part of Letters Patent No. 452,246, dated May 12, 1891.

Application filed August 30, 1890. Serial No. 363,480. (Model.)

To all whom it may concern:

Be it known that I, JAMES WINANTS TALLMADGE, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Apparatus for the Manufacture of Hydrogen Gas, of which the following is a specification.

This invention relates to an apparatus for the production of carbureted hydrogen gas in which the hydrocarbon liquid is floated on the acid solution, said apparatus being especially adapted for the illumination of buildings from isolated plants.

The objects of the invention are to provide a portable gas apparatus of this character of comparatively large capacity, which can be readily passed through a door or window to be placed in the cellar or other convenient location within the building to be illuminated; to provide convenient means for recharging the apparatus with the metal to be consumed in the production of the hydrogen gas without permitting the escape of the gas; to provide a safety-valve which will prevent the hydrocarbon liquid from being forced out of the generating-compartment when the lights are shut off, and to provide convenient means for charging the hydrocarbon liquid into the apparatus without the escape of gas therefrom.

Figure 1 of the accompanying drawings represents a vertical section of a building and a longitudinal vertical section of this improved gas apparatus disposed in the cellar thereof, the pipes leading from said apparatus to the gas-fixtures being shown on an enlarged scale. Fig. 2 represents a transverse section on line 2 2 of Fig. 1 of this improved gas apparatus. Fig. 3 represents a longitudinal section of the tank, the metal tray and its supporting mechanism being shown in working position in full lines and in open position in dotted lines. Fig. 4 represents a vertical section, on an enlarged scale, of the safety-valve. Fig. 5 represents a vertical section, on an enlarged scale, of the filling device for the hydrocarbon liquid.

Similar numerals of reference indicate corresponding parts in the different figures.

The tank 10, constituting a part of this improved gas apparatus, may be disposed in the

cellar or basement of a building to be illuminated, or at any other convenient point adjacent thereto. This tank is elongated horizontally to enable it to hold a large quantity of acid liquor, and is preferably of such width and height as to enable it to be passed through an ordinary window or door. It is preferably made of wood and provided with an interior lining 11 of lead or other suitable material, or the tank may be made of vitrified pottery or other suitable material. Standards or lugs 12 are disposed on opposite sides of the tank and project slightly above its top. The upper part of the tank is divided into a generating-compartment 13 and a reservoir-compartment 14. The generating-compartment 13 extends downward from the top of the tank and terminates above the bottom thereof, being open at its lower end into the tank. This generating-compartment is also provided with a suitable lining 15, and it is preferably attached to the cover 16 of the tank, said cover constituting the top of said compartment. Instead of being so attached, the generating-compartment may be formed by a transverse partition 17, extending downward from the top of the tank toward the bottom thereof, as illustrated in Fig. 3.

A perforated tray 20 or its equivalent for containing metal scraps to be consumed by the acid for producing hydrogen gas is supported within the generating-compartment 13 upon movable supports, by which it may be withdrawn through the open bottom of the generating-compartment and through the reservoir-compartment without the escape of gas from the generating-compartment when the metal needs to be replenished. The movable supports, as shown, comprise curved arms 21, attached to dependent arms 22. These arms 22 are connected with levers 23, pivoted at 24 to the lugs or standards 12, attached to the center of the tank at opposite sides thereof. These arms are preferably connected by the cover-plate 25, which serves to cover a portion of the reservoir-compartment, the remaining portion of said compartment being closed by a fixed cover 26. The cover 25 has a weight 27 on its under side to counterbalance the metal in the tray. The tray 20 is pivoted at 28 to the upper ends of the curved arms 21,

whereby it maintains a horizontal position during the movement of its supports.

A filling device for supplying a suitable hydrocarbon is disposed in the top of the gas-compartment, and comprises a tube 31, extending above the top of said compartment, and a pipe-trap depending below said top and consisting of a U-shaped pipe 32, having one end elongated to extend through the cover. The tube 31 preferably extends through the wall to the outside of the building and is closed by a cap 33.

A safety-valve 40 is disposed in connection with the generating-compartment 13 to prevent the hydrocarbon liquid from being forced out of the generating-compartment. This safety-valve comprises a dependent tube 41, extending downward through the top of the gas-generating compartment, and a float 42, having a hollow stem 43 adapted to slide vertically on said dependent tube. The hole in the stem 43 is of larger diameter than the dependent tube 41 to permit the gas to pass through said stem around said tube. The lower end of the hollow stem is closed and a small quantity of mercury 44 is disposed therein, which forms a liquid seal for closing said tube. The float 42 is of such gravity as to float upon the acid solution, but not upon the hydrocarbon liquid. The dependent tube is provided above the top of the generating-compartment with an escape-pipe 45, which passes through the wall of the building, and is provided with a downturned outlet 46 outside said wall. This escape-pipe is preferably provided with an offset 47 to prevent the mercury from being blown out with the gas.

A gas-education pipe 50 leads from the top of the generating-compartment and connects with the service-pipes extending to the different parts of the building to be supplied with gas, said pipe being preferably provided with a stop-cock 51 near the top of the generating-compartment.

In the use of this apparatus the tank 10 is placed in the desired position and the proper pipe connections, as hereinbefore referred to, are made. The tank is then partially filled with a suitable acid liquor 60, such as a dilute sulphuric-acid solution, said liquor being sufficient in quantity to rise above the open lower end of the generating-compartment 13 and above the bottom of the metal tray 20 when normally disposed therein. A quantity of a suitable hydrocarbon liquid 70 is then fed into the generating-compartment 13 through the feed-pipe 31 and floats upon the surface of the acid liquor within the generating-compartment. After the desired quantity of hydrocarbon is fed through the tube 31 a small quantity of the acid liquor is fed into the feed-pipe, and this liquor pushes out the hydrocarbon remaining in the pipes 31 and 32 and forms a trap or water seal in the bend of said pipe and prevents evaporation of hydrocarbon from said pipe and the entrance of gas thereinto. Thus the odor of

hydrocarbon about the apparatus is avoided. The levers 23 are then swung into positions the reverse of normal, as indicated in dotted lines in Fig. 3, whereby the metal tray 20 is withdrawn downward from the generating-compartment 13 and upward through the reservoir-compartment 14 and suspended in convenient position for the placing of the metal scraps thereon. The required quantity of scrap-iron 80 or other suitable metal scrap is then placed upon the tray and said tray swung into the tank and into normal position in the generating-compartment 13 thereof, as shown in Fig. 1. In this position the metal scrap 80 is submerged or partially submerged in the acid liquor 60. The acid attacks the metal and hydrogen gas is generated, which rises through the layer 70 of the hydrocarbon liquid floating on said solution within the generating-compartment and becomes impregnated with hydrocarbon vapor. The carburated hydrogen thus formed accumulates in the generating-compartment and passes out through the education-pipe 50 for supplying the burners connected with the gas apparatus. When the burners are shut off, gas accumulates in the generating-compartment and the pressure thereof forces down the liquid in said compartment until the acid liquor falls below the tray and the hydrocarbon submerges the metal therein. The formation of gas then ceases. If sufficient acid remains in the metal to continue the generation of gas after the burners are shut off to such an extent as would cause the level of the acid solution to fall below the open lower end of the generating-compartment 13 and permit the hydrocarbon to escape into the reservoir-compartment 14, the safety-valve 40 will permit the gas to blow off before the hydrocarbon can escape. The float 42 of said valve in such case descends until the mercury 44 within the hollow spindle 43 falls below the lower end of the dependent tube 41, whereby the gas is permitted to escape downward through said hollow spindle, upward through said tube, and out through the escape-pipe 45 to the outside atmosphere. As undue pressure is removed, the level of the acid liquor within the generating-compartment rises, carrying the float-valve upward, causing the mercury seal to close the lower end of the tube. A proper level of acid liquor is thus maintained in the generating-compartment and escape of the hydrocarbon prevented.

I claim—

1. In a gas apparatus, the combination of a horizontally-elongated tank for containing an acid liquor, provided with a vertical transverse partition terminating above the bottom of the tank and forming a generating-compartment at one end of the tank, in the upper part thereof, and a reservoir-compartment at the other end of the tank, said reservoir-compartment extending below the partition and beneath the generating-compartment, which opens at its lower end into said reservoir-com-

partment, and a tray supported within said compartment for containing metal to be acted upon by said liquor, substantially as described.

2. In a gas apparatus, the combination of a horizontally-elongated tank for containing an acid liquor, provided with a vertical transverse partition terminating above the bottom of the tank and forming a generating-compartment at one end of the tank, at the upper portion thereof, dependent swinging arms connected with pivots disposed adjacent to said partition, curved arms connected to the lower ends of said dependent arms and extending longitudinally of the tank beneath said partition and upward into the generating-compartment, and a perforated tray pivoted to said curved arms.

3. In a gas apparatus, the combination of a tank 10, provided with lugs 12, and a central vertical transverse partition 15 opposite said lugs, terminating above the bottom of the tank and forming a generating-compartment 13, levers 23, pivoted to said lugs, dependent arms 22, attached to said levers and extending below said partition, curved arms 21, attached to the lower ends of said dependent arms and extending beneath said partition into said generating-compartment, and the tray 20, pivoted to the upper ends of said curved arms.

4. In a gas apparatus, the combination of a tank for containing an acid liquor, a generating-compartment, pivoted levers, dependent bent arms attached to said levers, a tray for containing metal pivoted to said arms, and a cover connecting said levers and covering a portion of said tank, substantially as described.

5. In a gas apparatus, the combination of a tank for containing an acid liquor, a generating-compartment, pivoted levers, dependent bent arms attached to said levers, a tray for

containing metal pivoted to said arms, and a cover connecting said levers and covering a portion of said tank, said cover being weighted, substantially as described.

6. In an apparatus for producing carburated-hydrogen gas, the combination of a reservoir-chamber for containing an acid liquor, a generating-chamber open at its lower end into said reservoir-chamber and terminating above the bottom of said reservoir-chamber, a tray for holding metal to be acted upon by said liquor, supported within said generating-chamber above the lower open end thereof, and an automatic blow-off valve connected with said generating-chamber for regulating the height of the acid liquor therein.

7. In a gas apparatus, the combination of a generating-compartment for containing an acid liquor, a tray for containing metal supported within said generating-compartment, a dependent tube extending through the top of said compartment, and a float-valve adapted to float on said liquor, provided with a hollow stem surrounding said dependent tube and provided with a mercury seal.

8. In a gas apparatus, the combination of a generating-compartment for containing an acid liquor, a tray for containing metal supported within said generating-compartment, a dependent tube extending through the top of said compartment, a float-valve adapted to float on said liquor, provided with a hollow stem surrounding said dependent tube and provided with a mercury seal, and an escape-pipe connected with said dependent tube and provided with an offset, substantially as described.

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Witnesses

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