No. 771,863. PATENTED OCT. 11, 1904.

F. W. DE TRAY.

VAPOR LIGHTING AND HEATING DEVICE.

APPLICATION FILED APR. 17, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

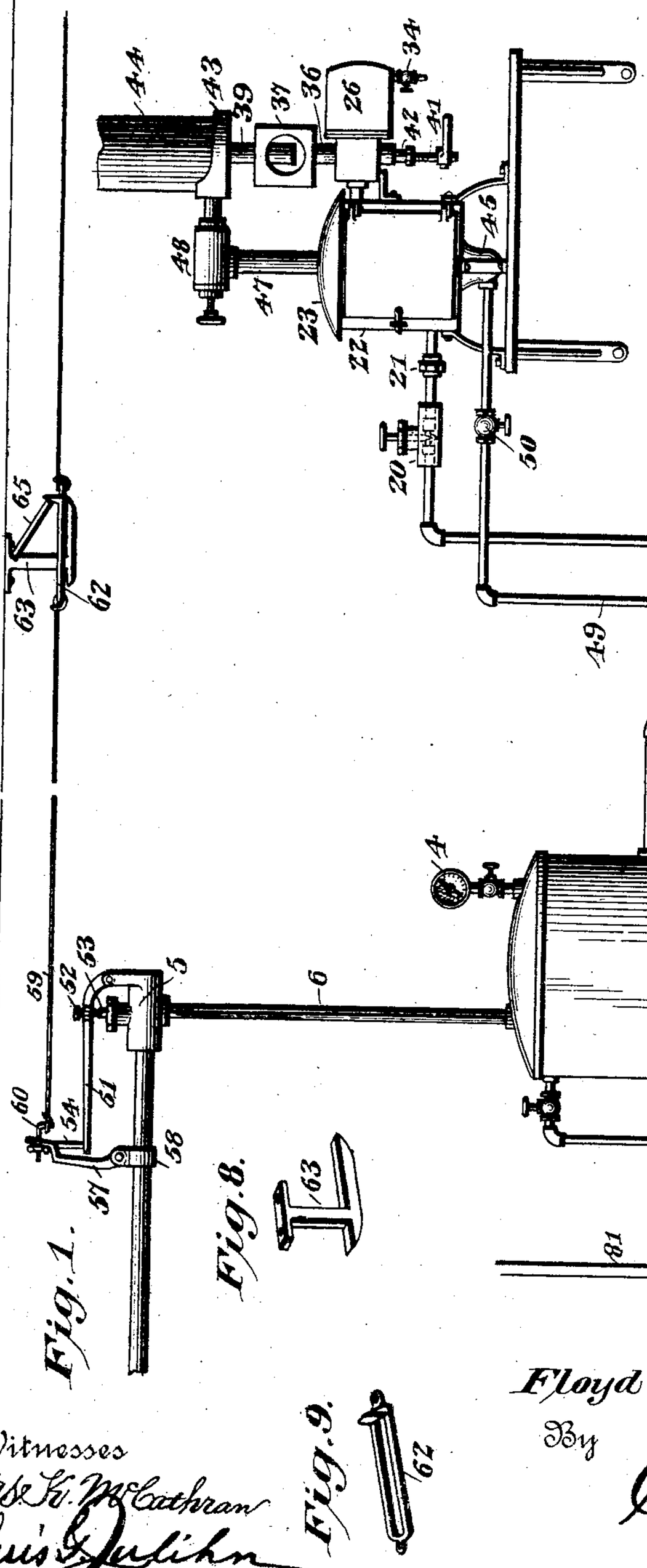

Fig. 1.

Fig. 8.

Fig. 9.

Witnesses
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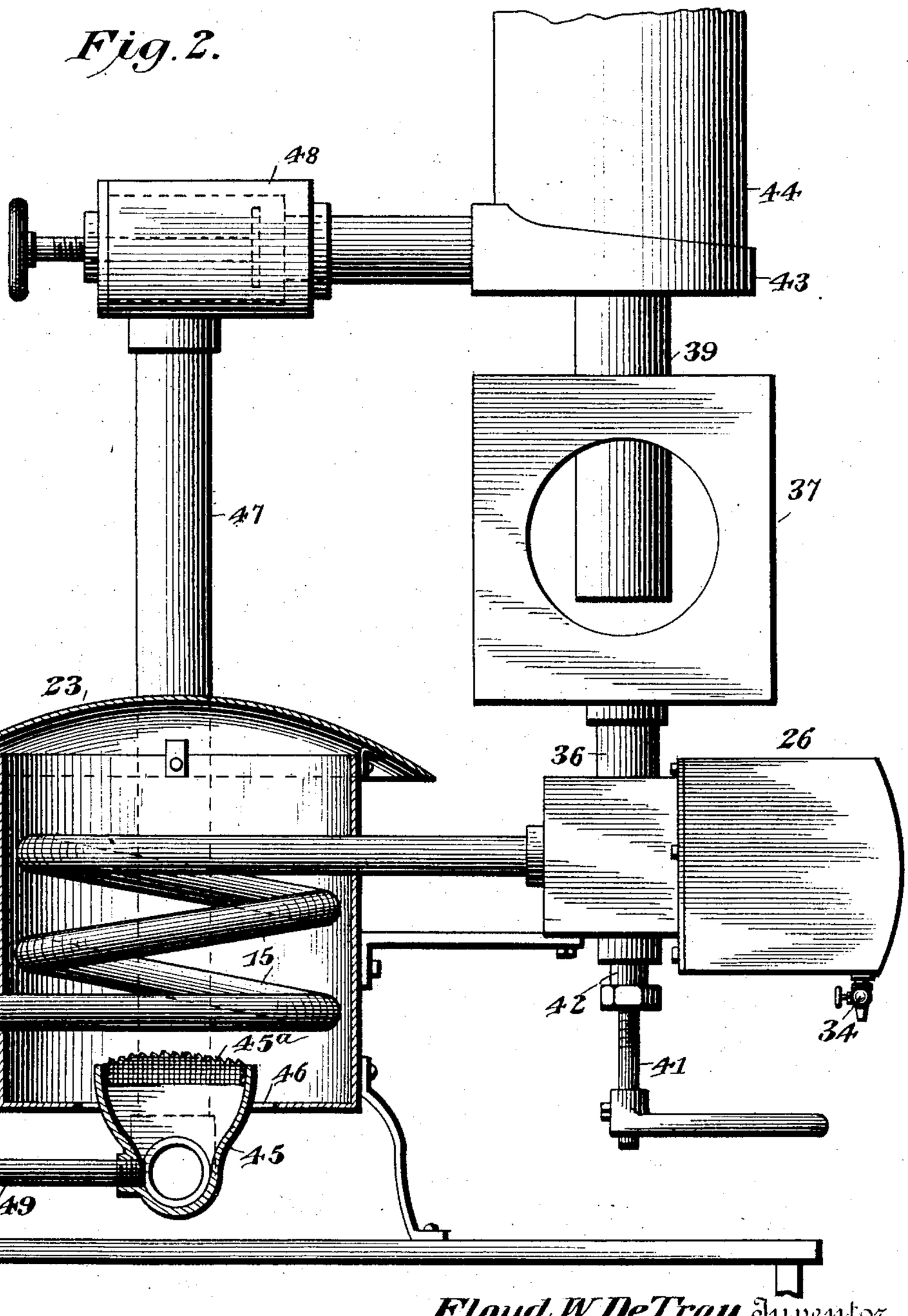
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

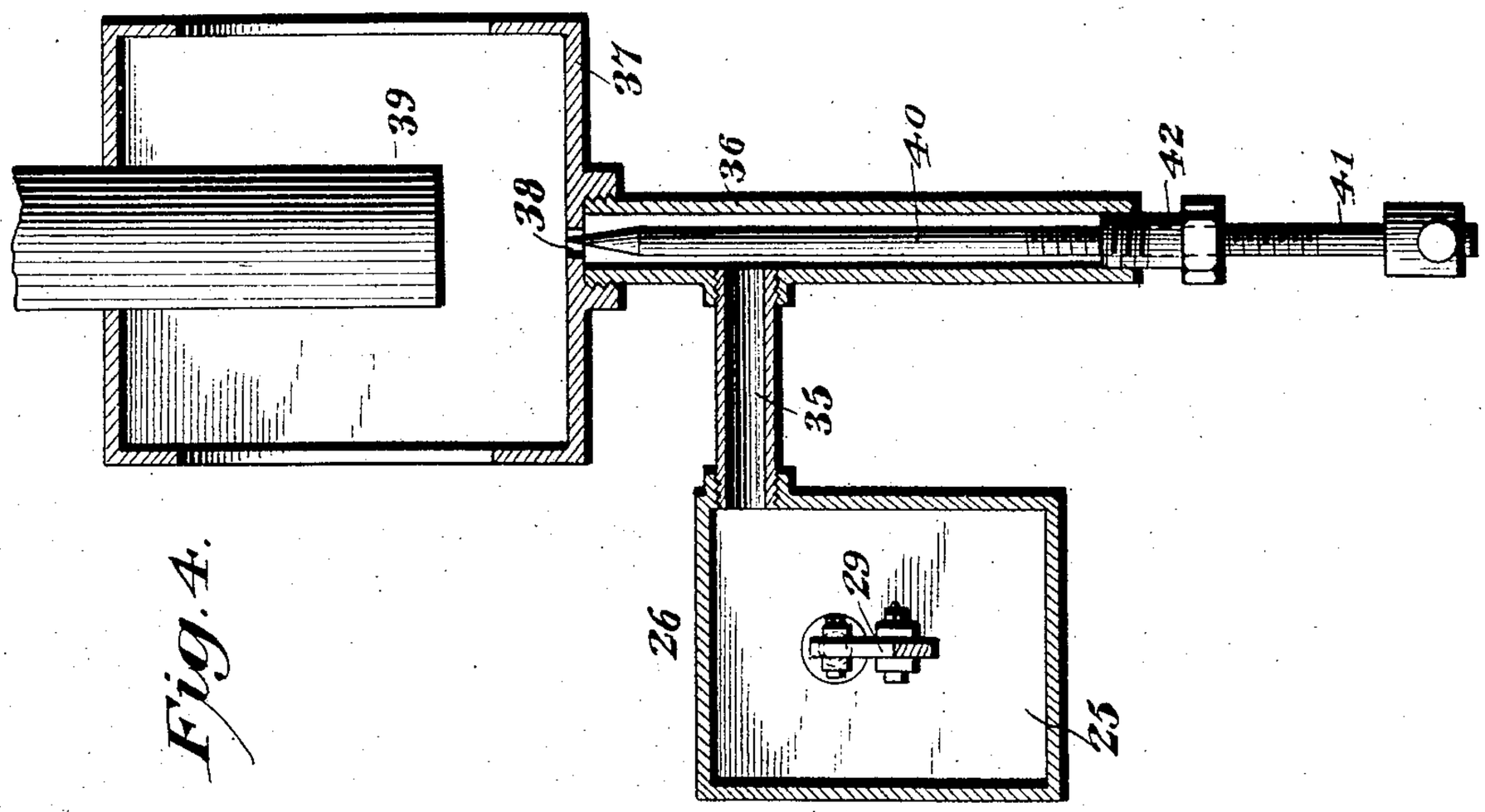

Fig. 4.

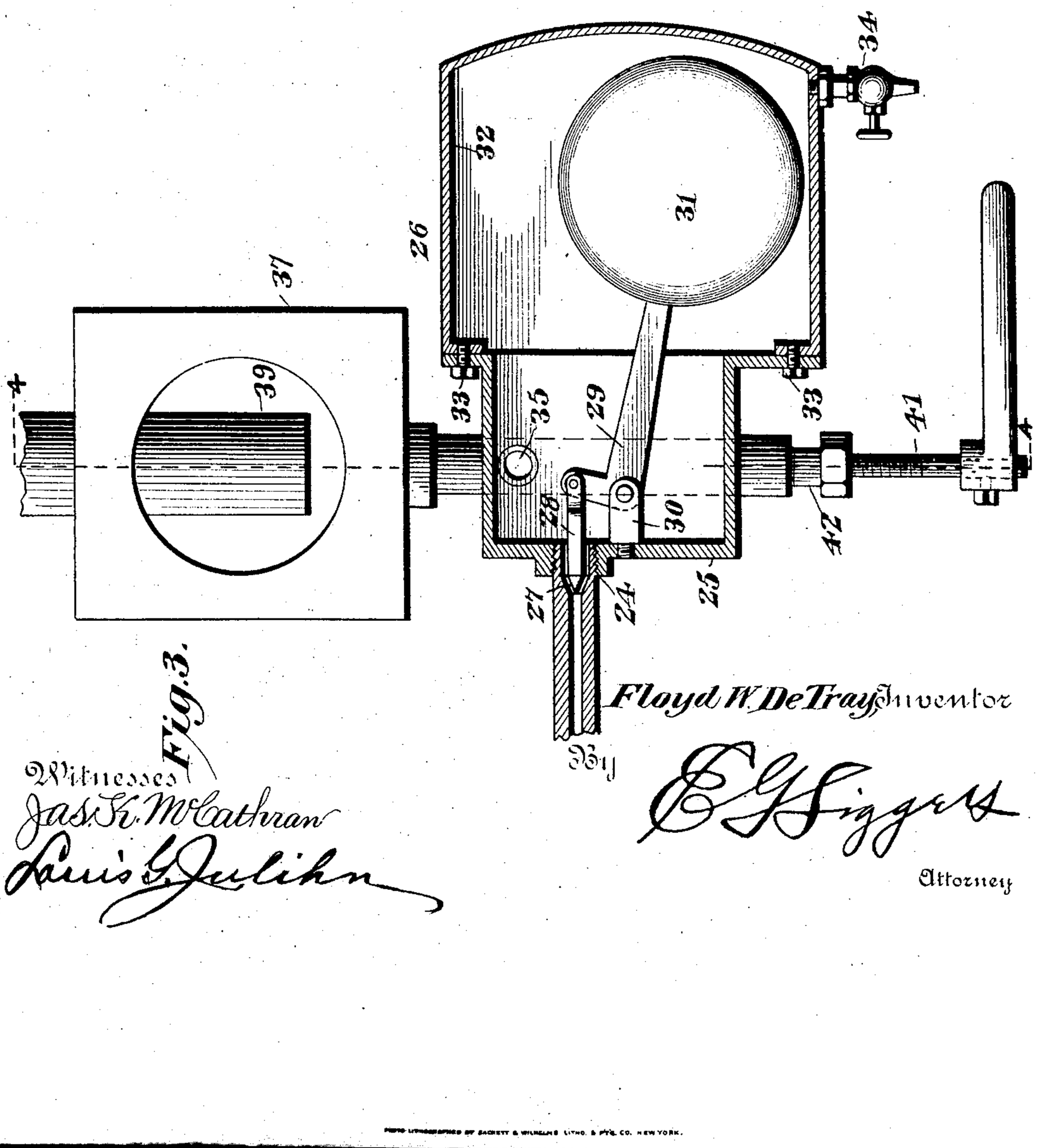

Fig. 3.

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NO MODEL. 4 SHEETS—SHEET 4.

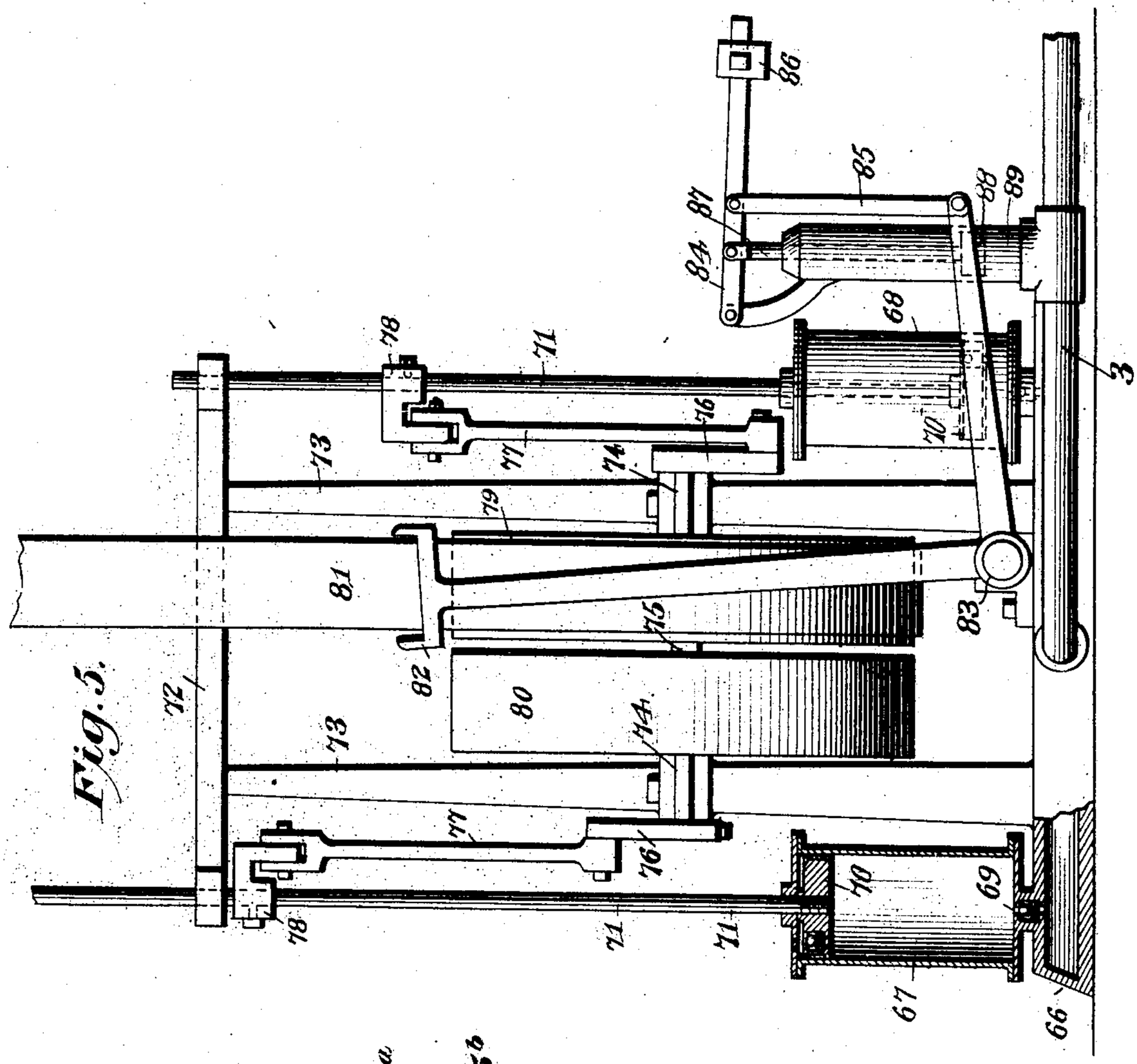

Fig. 5.

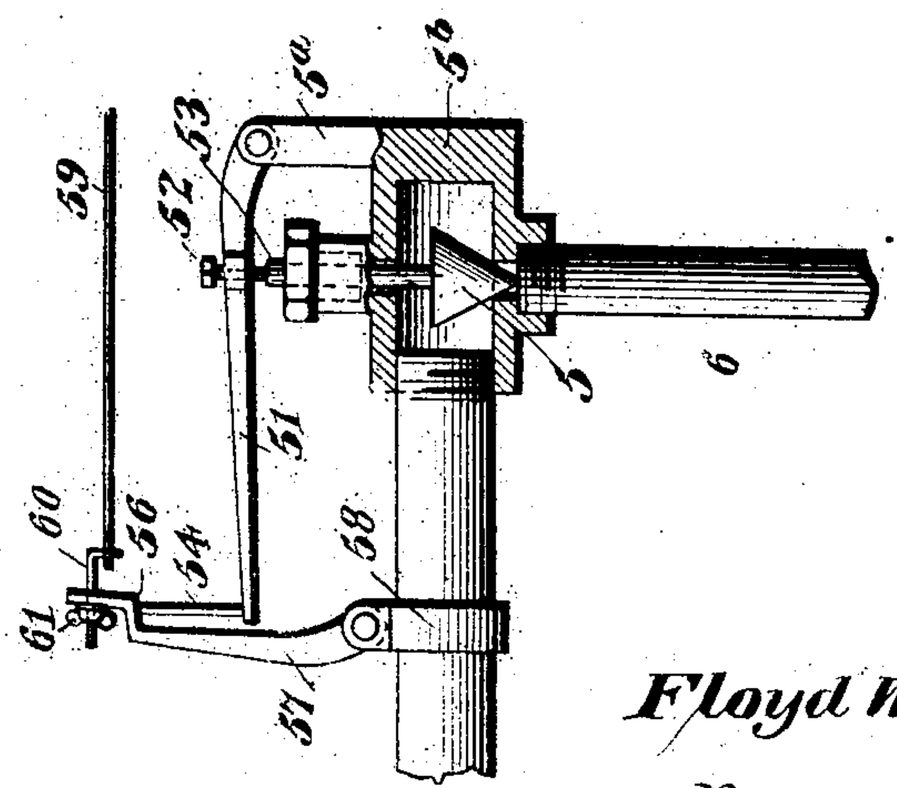

Fig. 6.

Fig. 7.

Witnesses
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PHOTO-LITHOGRAPHED BY SACHETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

No. 771,863. Patented October 11, 1904.

UNITED STATES PATENT OFFICE.

FLOYD WM. DE TRAY, OF CHICAGO, ILLINOIS, ASSIGNOR TO GEORGE E. FINK, OF CHICAGO, ILLINOIS, AND KNOXALL MANUFACTURING COMPANY, A CORPORATION OF ILLINOIS.

VAPOR LIGHTING AND HEATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 771,863, dated October 11, 1904.

Application filed April 17, 1903. Serial No. 153,123. (No model.)

To all whom it may concern:

Be it known that I, FLOYD WM. DE TRAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Vapor Lighting and Heating Device, of which the following is a specification.

This invention relates to a novel lighting and heating apparatus of that type in which a mixture of gasolene-vapor and air is utilized as a fuel.

It is well understood that apparatus of this character as frequently constructed is exceedingly dangerous and that it is impossible to obtain fire insurance because of the extraordinary hazard. It is equally true, however, that considerations of economy and convenience have led to the extended installation of lighting and heating systems of this general type, and The National Board of Fire Underwriters have therefore formulated certain rules and requirements, compliance with which in the construction and maintenance of gasolene-vapor-gas-lighting systems will reduce the risk to the extent necessary for the obtainment of insurance on a building equipped with such systems.

The object of my invention, therefore, is to produce a comparatively simple and inexpensive lighting and heating apparatus or system which will comply with the underwriters' requirements, particularly as to the utilization of a subflame for the generation of the vapor, the provision of an automatic safety-trap preventing the escape of gasolene into the service-pipes in case the subflame is accidentally extinguished, the storage of only a small quantity of gasolene in liquid form on the premises, and the automatic reduction of pressure in the system in the event of fire.

To the accomplishment of this general object and others subordinate thereto the invention in its preferred embodiment resides in the construction and arrangement of parts which is hereinafter described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In said drawings, Figure 1 is a side elevation of the apparatus complete. Fig. 2 is a sectional elevation, on an enlarged scale, of the vaporizer, safety-trap, mixing-chamber, and the immediately-connected parts. Fig. 3 is a sectional elevation designed particularly for the illustration of the safety-trap, the automatic cut-off valve being shown in one position in dotted lines. Fig. 4 is a sectional view on the line 4 4 of Fig. 3. Fig. 5 is a sectional elevation of the air-compressor. Fig. 6 is a detail sectional view, partly in elevation, of the safety-valve and the adjacent portion of the automatic release mechanism. Fig. 7 is a detail perspective view of one of the fuse-blocks; and Figs. 8 and 9 are detail views of the bracket and slide, respectively, of the release mechanism.

Like numerals are employed to designate corresponding parts throughout the views.

Referring first to Fig. 1 for the purpose of securing a general idea of the system as a whole, 1 indicates an air-compressor designed to supply air under pressure to a comparatively large air-reservoir 2 through a valved pipe 3. The reservoir is provided with a pressure-gage 4, by means of which the pressure in the system is readily observed, and with a safety-valve 5, located in a pipe 6, leading from the reservoir to the exterior of the building in which the apparatus is installed. The safety-valve is controlled by automatic release mechanism, to be hereinafter described, designed in the event of fire to permit the opening of the valve and the consequent reduction of the pressure in the system.

Compressed air is supplied alternately to a pair of gasolene-tanks 7 and 8 from the reservoir 2 through a pipe 9, having branches 10 and 11 leading to said tanks and controlled by a three-way valve 12, which may be turned for the purpose of placing one of the gasolene-tanks in communication with the air-reservoir while the other tank is being filled with gasolene. Each of these tanks is provided with a valved filling-tube 13, into the upper end of which a funnel 14 may be inserted, as shown.

The gasolene under pressure is supplied

from either gasolene-tank to the generating or vaporizing coil 15 through a pipe 16, having branches 17 and 18 communicating with the tanks at their lower ends and provided with check-valves 19. These check-valves while permitting the passage of gasolene to the vaporizer prevent back pressure in the tank which is out of use. The quantity of gasolene permitted to pass through the pipe 16 is controlled by a needle-valve 20, said pipe being connected to the copper coil 15 by a union 21. The coil 15 is inclosed within a chamber 22, (see Fig. 2,) provided with a hood 23, supported by but spaced above the chamber to provide a vent for the products of combustion. The upper end of the coil is passed through one side of the chamber 22 and is screwed into a threaded opening 24 in one wall of the casing 25 of the automatic safety-trap, (indicated as a whole by 26.) The bore of the coil-terminal is enlarged to form a seat 27 for an automatic cut-off or trap valve 28, pivotally secured to the short arm of a bell-crank float-lever 29, fulcrumed upon a bracket 30 in the trap-casing. The long arm of the float-lever is provided with a float 31, accommodated within an enlargement 32 of the casing 25. This enlargement is preferably in the form of a separate casting secured in place by screws 33 and provided in its bottom wall with a drip-cock 34, by means of which the casing may be drained when necessary.

Adjacent to its top the casing 25 communicates through a coupling 35 with a comparatively long vertically-disposed valve-casing 36, supporting at its upper end an air-chamber 37, into the bottom wall of which the casing is screwed. (See Fig. 4.) The upper side walls of the air-chamber 37 are open, and the bottom wall thereof is provided with a jet-opening 38, disposed directly opposite the lower end of a mixing-tube 39 and controlled by a needle-valve 40, located in the casing 36 and designed to regulate the supply of vapor to the mixing-tube. The stem 41 of the needle-valve 40 is threaded through a gland 42, screwed in the lower end of the valve-casing. The mixing-tube 39 depends from a cap 43 upon the lower end of the service-pipe 44 and extends through the top of the air-chamber to a point a short distance above the jet-opening 38 in the bottom wall thereof.

The vaporizing-coil 15 is designed to be heated by a subflame-burner 45, extended upwardly through an opening 46 in the bottom wall of the chamber or housing 22 and designed to be supplied with gas through a burner-tube 47, communicating with the service-pipe 44 and controlled by a burner-valve 48. The burner 45 is provided with a suitable foraminous cap 45^a, preferably formed of gauze.

In starting the apparatus it is impossible to supply the burner from the service-pipe, and I therefore provide it with an auxiliary tube 49, communicating with the top of one of the gasolene-tanks and controlled by a valve 50. The end of the pipe 49 which communicates with the tank is always located above the level of the fluid contained in said tank, and the pipe constitutes a conduit for the mixture of gas or fumes of the gasolene and air contained in the space above the gasolene, said mixture therefore being employed in the preliminary heating of the vaporizing-coil.

We may now consider the operation of the system under normal conditions.

The air-compressor 1, being driven by a motor of any suitable character, (not illustrated,) compresses the air within the reservoir 2, from whence it is led to one of the gasolene-tanks—for instance, the tank 7. The gasolene within this tank is forced by the pressure of air above it to the vaporizing-coil 15 through the pipe 16, the check-valve 18 preventing back pressure within the tank 8, which perchance is being filled with gasolene. Within the coil 15 the gasolene is vaporized and escapes thence into the trap-casing 25, thence through the coupling 35 to the valve-casing 36, from whence it is projected through the jet-opening 38 into the open lower end of the mixing-tube 39. As the vapor passes into the tube 39 it draws with it from the air-chamber 37 a sufficient quantity of air to form with the vapor a combustible mixture or gas. The gas passes from the mixing-tube 39 into the service-pipe of the system, from whence is led through the burner-tube 47 a sufficient quantity to supply the subflame-burner 45, which heats the coil 15. If now the subflame should be extinguished, the cooling of the coil 15 will prevent the vaporization of the gasolene, the latter will escape to the trap-casing in its liquid form, and a predetermined accumulation thereof will raise the float 31, thereby swinging the lever 29 to close the trap-valve 28 and thus completely cut off further flow of the gasolene. This automatic cut off of the liquid will obviously occur before the liquid-level in the trap-casing 25 has risen sufficiently to permit the escape of gasolene from the trap-casing through the coupling 35.

In addition to the arrangement for the automatic cut off for the gasolene upon the extinguishment of the subflame it is also necessary to provide for the automatic reduction of the pressure within the system in the event of fire, since it is obvious that such reduction of pressure will prevent further supply of gasolene to the vaporizer, it being observed that the location of this vaporizer in a plane considerably above the gasolene-tanks necessitates the application of sufficient pressure to lift the liquid. It is for the attainment of this end that the pipe 6 is led from the air-reservoir to the exterior of the building and is provided with a safety-valve 5.

To an upstanding arm 5^a on the casing 5^b

of the safety-valve is fulcrumed a valve-lever 51, disposed horizontally and provided with an adjusting-screw 52, which bears upon the upper end of the stem 53 of the safety-valve 5. The screw 51 is located comparatively near the fulcrum of the lever, and at the extremity of the latter is supported a fuse-block 54, having its upper end notched, as indicated at 55, to engage a shoulder 56, formed on a swinging arm 57, disposed vertically, and having pivotal connection with a split collar 58, retained upon the horizontal portion of the pipe 6. (See Fig. 6.) The mounting of the arm 57 is such that the latter if unrestrained will swing back from the adjacent end of the valve-lever, thus dislocating the fuse-block 54 and permitting the valve-lever to rise under the pressure of air opposed to the under side of and tending constantly to open the safety-valve 5. To prevent the swinging of the arm 57 in the manner indicated under normal conditions, I provide a wire 59, extending to various parts of the building within which the system is installed and secured at one end to the upper extremity of the arm 57 by means of a bolt 60 passed through the arm 57 and provided with a thumb-nut 61. By turning the nut 61 the bolt 60 may be drawn longitudinally for the purpose of adjusting the tension of the wire 59. At various points in the length of the wire the latter is provided with links 62, slidably supported by fixed brackets 63, and each provided with a lug 64 at one end. Between the lug of each link and the adjacent bracket 63 a fuse-block 65 is disposed in an angle, as indicated in Fig. 1. It will now be seen that in the event of fire the fusing of the fuse-blocks 54 or 65 will effect the release of the valve-lever, and the air under pressure opening the safety-valve and escaping through the pipe 66 will reduce the pressure within the reservoir to such an extent that the gasolene will not be lifted to the vaporizer and the supply of gas to the system will thus be cut off.

In Fig. 5 I have shown a specially-designed air-compressor which by preference is employed in connection with the system. Upon a hollow base 66 are supported a pair of pump-cylinders 67 and 68, communicating with said base through valved passages 69. Within each cylinder is a valved piston 70, whose piston-rods 71 are guided in the opposite ends of a cross-bar 72, supported by a pair of vertical standards 73, rising from the base. The standards 73 are provided with suitable journal-boxes 74, in which is journaled a power-shaft 75, provided with cranks 76, connected by pitmen 77 to cross-heads 78, secured to the piston-rods. Upon the power-shaft 75 are mounted intermediate of the standards a fixed pulley 79 and a loose pulley 80. The driving-belt 81 is mounted on the fixed pulley 79, as shown, but is designed under certain conditions to be shifted to the loose pulley by a belt-shifter 82 in the form of a bell-crank lever fulcrumed upon the base, as indicated at 83, and connected at one extremity to a swinging arm 84 by means of a link 85. At its outer end the arm 84 is provided with an adjustable counterweight 86 and at a point adjacent to its fulcrum is pivotally connected to the upper end of a piston-rod 87, connected to a solid piston 88, movable within a cylinder 89, communicating at its lower end with the pipe 3, leading from the hollow base 66 to the air-reservoir 2.

The group of elements comprehending the belt-shifter, the cylinder and piston 89 and 88, and the intermediate connections constitutes an automatic regulating device or governor, since it will be seen that whenever the air in the pipe 83 exceeds a given pressure, determined by the position of the counterweight 86, the piston 88 will be raised and the belt-shifter will be rocked in an obvious manner to shift the belt 81 from the fixed pulley 79 to the loose pulley 80, thus stopping the compressor. As soon, however, as the pressure in the pipe 3 falls below the predetermined point the counterweight 86 will return the piston and the belt-shifter to their normal positions, and the belt being thus restored to the fixed pulley the compressor will be put in motion until the air-pressure again exceeds the limit.

It is thought that from the foregoing the construction and operation of my heating and lighting apparatus will be clearly comprehended; but while the illustrated embodiment of the invention is thought at this time to be preferable I desire to be understood as reserving to myself the right to effect such changes, modifications, and variations of the illustrated structure as may fall within the scope of the protection prayed.

What I claim is—

1. In an apparatus of the character described, the combination with a source of liquid-fuel supply; of a vaporizer in communication therewith, a mixing-chamber located beyond the vaporizer, and a trap located in the line of communication between the vaporizer and mixing-chamber, said trap including a casing, a normally open valve controlling the passage of fluid to the interior of the casing from the vaporizer, a float-lever operatively connected to the valve, and a float connected to the lever and located within the casing to swing the lever and thus close the valve in the event of an accumulation of liquid fuel in the trap-casing.

2. In an apparatus of the character described, the combination with a source of liquid-fuel supply, of a vaporizer, a mixing-chamber located beyond the vaporizer, and a trap located in the line of communication between the vaporizer and mixing-chamber, said trap including a casing, a trap-valve controlling the inlet to the casing, a float within the

trap-casing, and a float-lever connected to the valve and float.

3. In an apparatus of the character described, the combination with a source of liquid-fuel supply, of a vaporizer, an automatic trap including a casing in communication with the vaporizer, and an automatically-operated valve controlling the inlet to the casing, an air-chamber in communication with the trap-casing, a mixing-tube extending into the air-chamber, a service-pipe communicating with the mixing-tube, and a valve controlling the escape of vapor from the trap.

4. In an apparatus of the character described, the combination with an air-reservoir, a fuel-tank in communication therewith, a vaporizer in communication with the tank, and a mixing-chamber and service-pipe located beyond the vaporizer, of a safety-valve controlling the escape of air from the reservoir, and a thermostatic device controlling the operation of the safety-valve.

5. In an apparatus of the character described, the combination with an air-reservoir, a fuel-tank in communication therewith and a vaporizer, mixing-chamber and service-pipe to which the fuel is supplied in succession by the pressure of air in the reservoir, of a safety-valve controlling the escape of air from the reservoir, a valve-lever for said valve, a swinging arm provided with a shoulder, a fuse-block interposed between the valve-lever and the shoulder of said arm, and other fuse-blocks disposed to retain said arm in its normal position.

6. In an apparatus of the character described, the combination with an air-reservoir and safety-valve and valve-lever, of a swinging arm provided with a shoulder, a fuse-block interposed between the shoulder and the lever, a wire connected to the arm and extended to various parts of the building, links located in the line of the wire and each having a projection, a bracket supporting each link, and a fuse-block interposed between the projection of each link and the adjacent bracket.

7. In an apparatus of the character described, the combination with an air-reservoir, fuel-tank, and a vaporizer; of means for placing the tank in communication with the air-reservoir and vaporizer, respectively, to supply fuel under pressure to the latter, a safety-valve for releasing the air in the air-reservoir, and means for automatically releasing the safty-valve in the event of fire.

8. In an apparatus of the character described, the combination with an air-reservoir, fuel-tank, and a vaporizer; of means for placing the tank in communication with the air-reservoir and vaporizer, respectively, to supply fuel under pressure to the latter, a safety-valve for permitting the exhaust of air from the air-reservoir, and means including a fusible device for retaining the safety-valve closed.

9. In an apparatus of the character described, the combination with an air-reservoir, fuel-tank, and a vaporizer; of means for placing the tank in communication with the air-reservoir and vaporizer, respectively, to supply fuel under pressure to the latter, a safety-valve for the air-reservoir, means for automatically releasing the safety-valve in the event of fire, and means for automatically stopping the flow of liquid fuel beyond the vaporizer when the latter fails to vaporize the liquid.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FLOYD WM. DE TRAY.

Witnesses:
F. H. De Tray,
Geo. E. Fink.