No. 676,285. Patented June 11, 1901.

F. VAN DUZEN.

SPRAYING AND VAPORIZING DEVICE FOR CRUDE OIL EXPLOSIVE ENGINES.

(Application filed Mar. 17, 1900.)

(No Model.) 4 Sheets—Sheet 1.

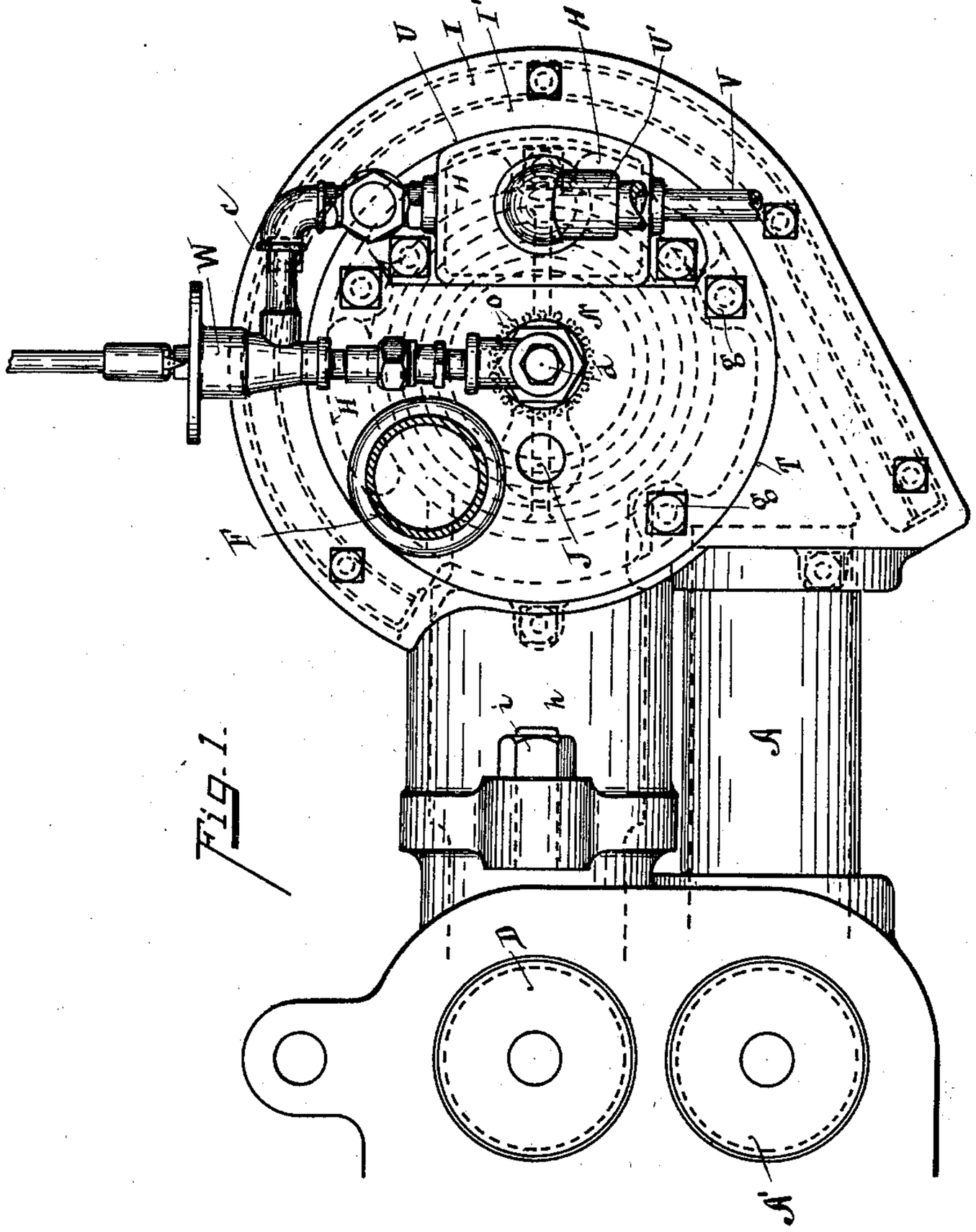


Fig. 1.

Witnesses
Viola T. Georgi
Oliver B. Kaiser

Inventor
Frank Van Duzen
by Wood, Boyd & Wood
Attorneys

No. 676,285. Patented June 11, 1901.

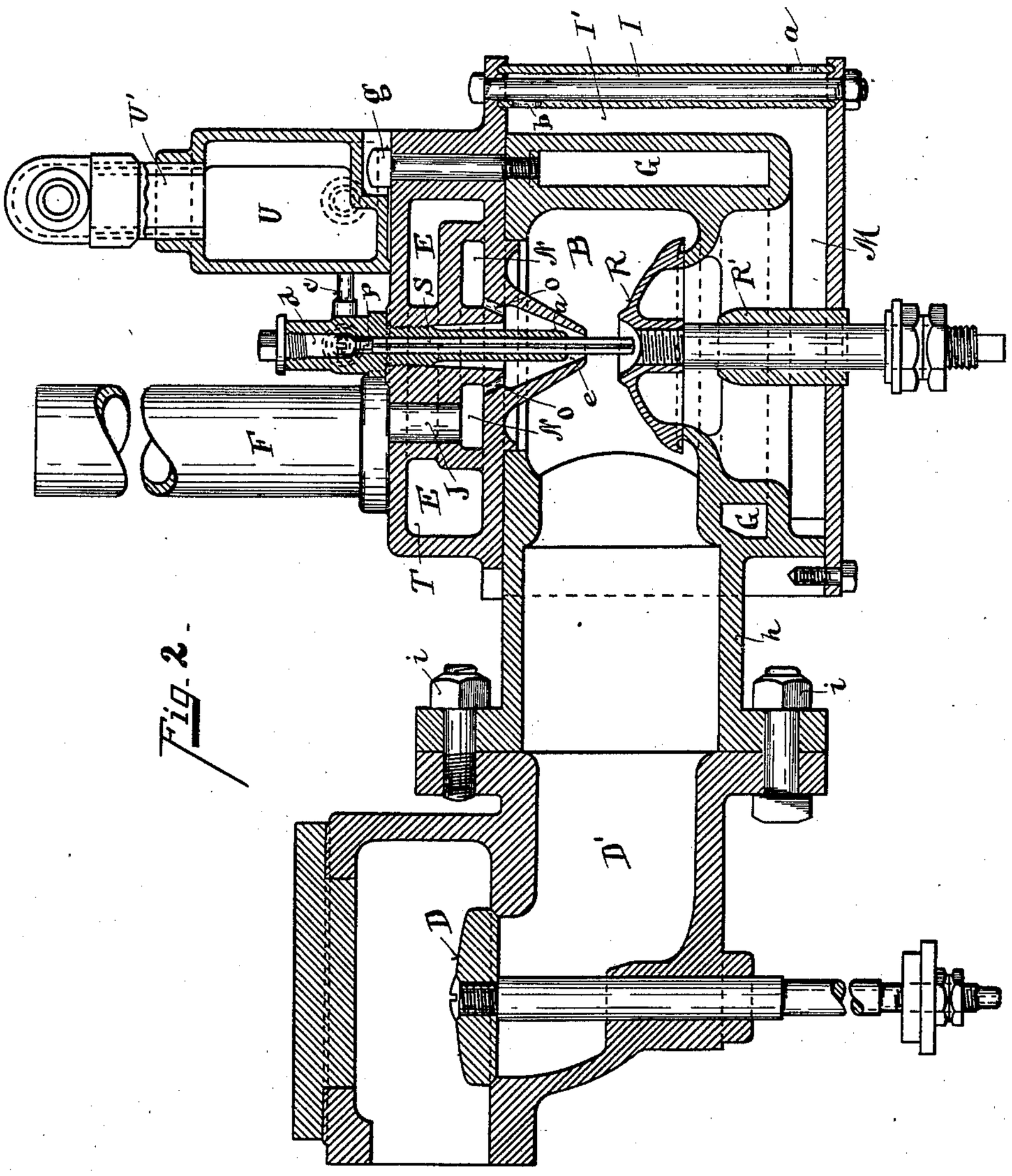
F. VAN DUZEN.

SPRAYING AND VAPORIZING DEVICE FOR CRUDE OIL EXPLOSIVE ENGINES.

(Application filed Mar. 17, 1900.)

(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



Witnesses

Viola L. George.

Olivia B. Kaiser

Inventor

Frank Van Duzen

by Wood, Boyd & Wood

Attorneys

No. 676,285. Patented June 11, 1901.

F. VAN DUZEN.

SPRAYING AND VAPORIZING DEVICE FOR CRUDE OIL EXPLOSIVE ENGINES.

(Application filed Mar. 17, 1900.)

(No Model.) 4 Sheets—Sheet 3.

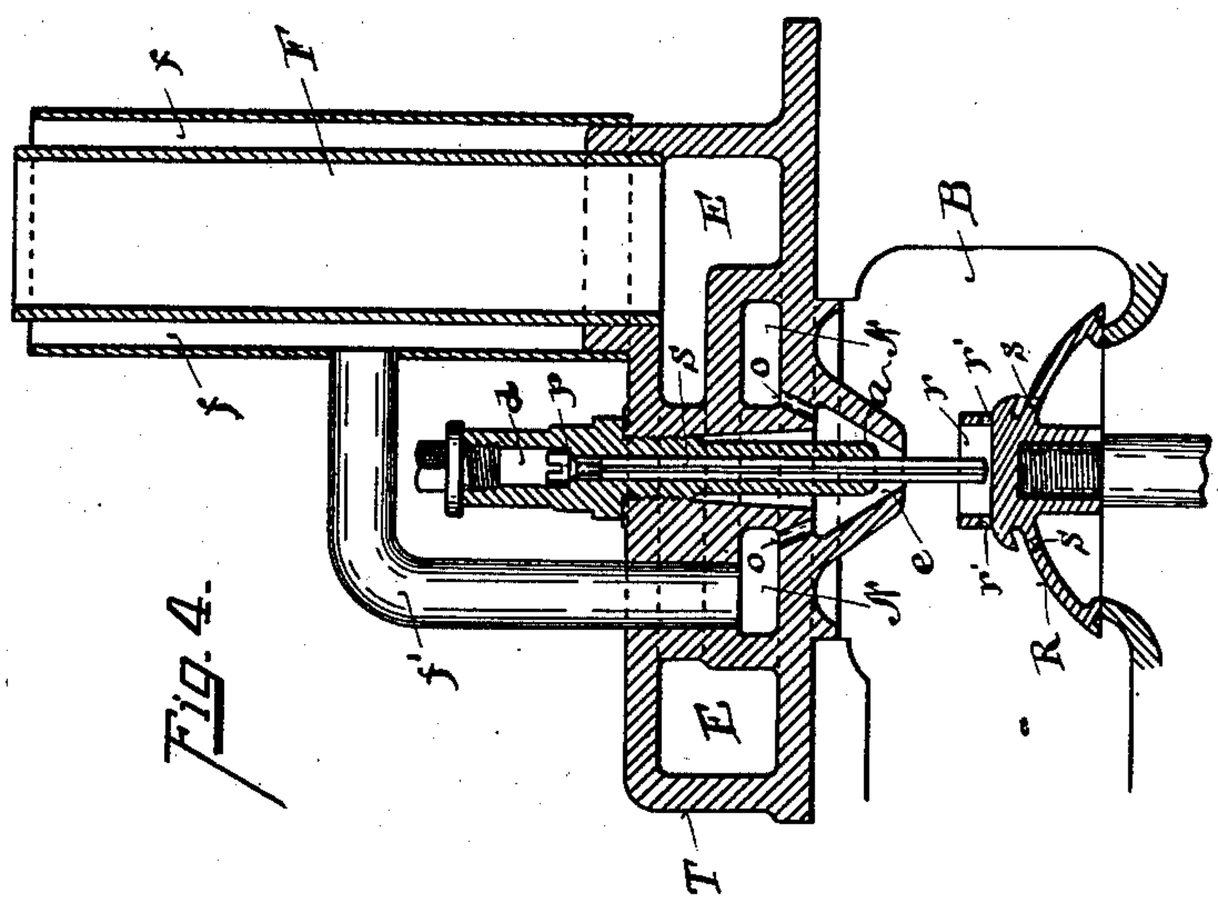


Fig. 4.

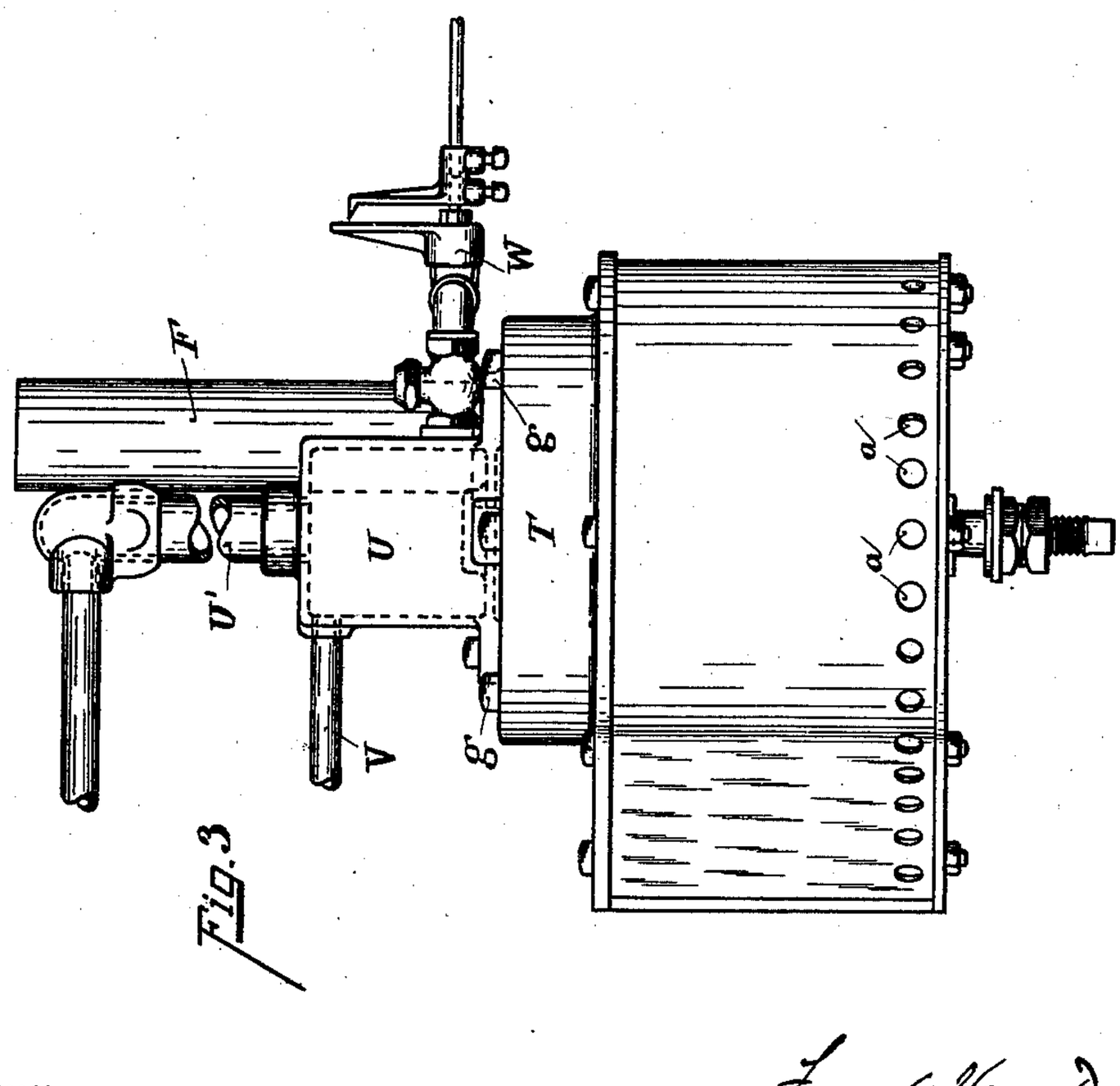


Fig. 3

Witnesses
Viola T. Georgi
Oliver B. Kaiser

Inventor
Frank Van Duzen
by Wood, Boyd & Wood
Attorneys

No. 676,285. Patented June 11, 1901.

F. VAN DUZEN.

SPRAYING AND VAPORIZING DEVICE FOR CRUDE OIL EXPLOSIVE ENGINES.

(Application filed Mar. 17, 1900.)

(No Model.) 4 Sheets—Sheet 4.

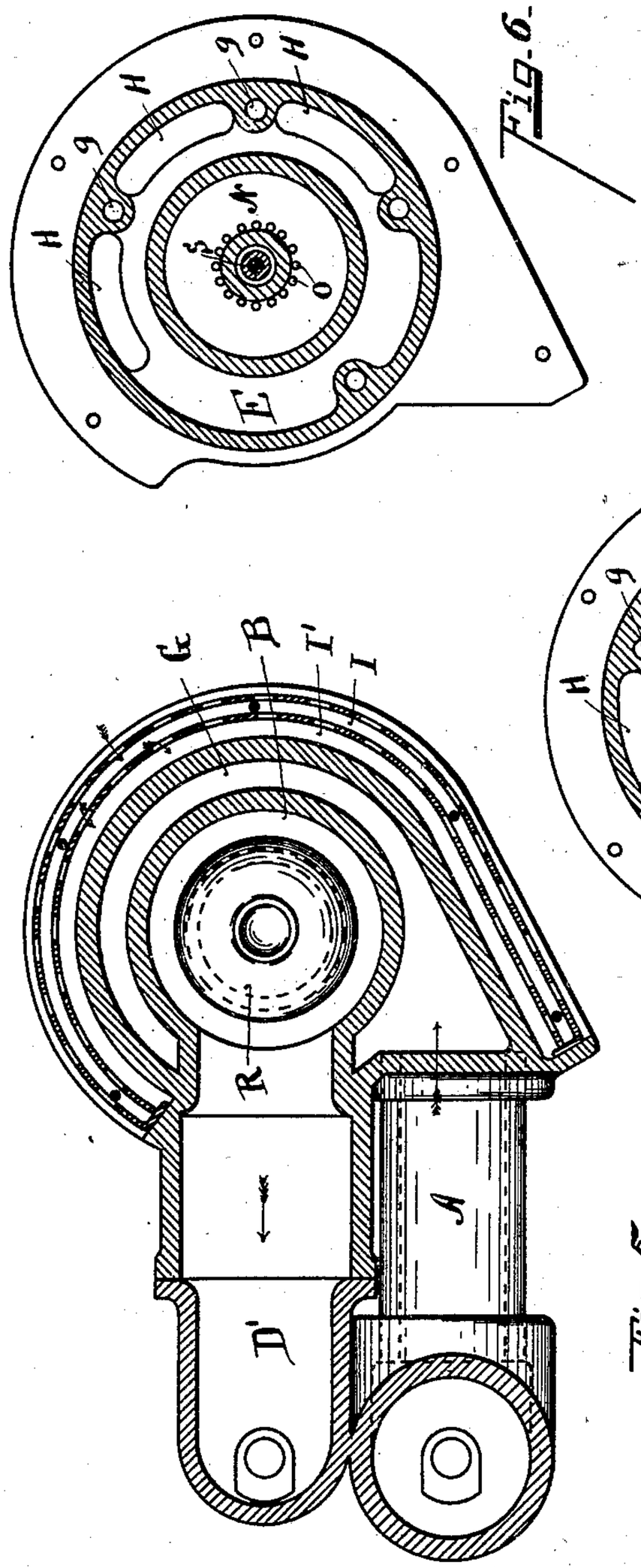


Fig. 6.

Fig. 7.

Fig. 5.

Witnesses
Oliver B. Kaiser
Pearl McMichael

Inventor
Frank Van Duzen
By Wood, Boyd & Wood
Attorneys

UNITED STATES PATENT OFFICE.

FRANK VAN DUZEN, OF MARION, OHIO.

SPRAYING AND VAPORIZING DEVICE FOR CRUDE-OIL EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 676,285, dated June 11, 1901.

Application filed March 17, 1900. Serial No. 9,031. (No model.)

To all whom it may concern:

Be it known that I, FRANK VAN DUZEN, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Spraying and Vaporizing Devices for Crude-Oil Explosive-Engines, of which the following is a specification.

My device relates particularly to that class of explosive-engines using crude oil as a fuel.

The object of my invention is to provide an improved apparatus for heating the air and crude oil before mixing and then mixing the same by a spraying device in the mixing-chamber located within the heater, the features of which are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a top plan view of my improvements. Fig. 2 is a section on line *x x*, Fig. 1. Fig. 3 is a side elevation of Fig. 1. Fig. 4 is a modification of the valves and mixing device shown in Fig. 2. Fig. 5 is a central horizontal section on lines *y y*, Fig. 2. Fig. 6 is a sectional view on lines *w w*, Fig. 2. Fig. 7 is a sectional view on lines *v v*, Fig. 2.

A represents an exhaust-pipe leading from the exhaust-valve of the cylinder located at A′ to the heating passages or jacket surrounding the mixer B.

G G represent conduits which partially surround the mixing-chamber and through which the gases or products of combustion generated in the cylinder pass on their way to the final exhaust port or pipe F, which is shown mounted on the top of the heater. The mixing-chamber is preferably of scroll form for convenience of construction and provided with air-jacket spaces I I′ for supplying air to the mixer.

a represents orifices admitting the air into the outer jacket. I and *b* represent orifices admitting air from the chamber I into the chamber or space I′. The air is heated by means of the exhaust-gases passing through the conduits G.

M represents an air-conduit leading from I′ to the automatic air-supplying valve R, which is supported and maintained by a suitable guide R′, as shown in Fig. 2. The exhaust-gases pass from the passages G into the heater and sprayer, located in the top T, through ports H H H (shown by dotted lines, Fig. 1) into the annular space E, which is tapped by the exhaust-pipe F.

U represents an oil-tank mounted upon the top of the mixer and receiving heat therefrom, whereby the oil is kept in a fluid condition, so as to freely flow from the outlet-pipe into the mixer.

c represents a pipe leading from said oil-chamber into the valve-chamber *d*, in which is located the oil-valve *p*, provided with a stem S, which depends down through the valve-pipe *a* in juxtaposition with the valve R, which when said valve is raised by the suction of the piston comes in contact with the said stem and lifts the oil-valve, allowing the oil to flow down around said stem and to be discharged from the mixer-nozzle *e*. The oil is still further heated in its passage to the nozzle.

N represents an annular chamber formed in the mixer T, as shown in Fig. 2, and is supplied with air through the opening J, leading to the atmosphere.

In order to spray or split up the oil, I provide a series of small orifices *o*, leading from the hot-air chamber N into the nozzle around the valve-chamber *d* and stem S. These orifices are of small area, so that only a small portion of air necessary to carburet the oil is supplied through the same, the larger amount of carbureting-air being supplied by the valve R, which is automatically operated by the suction-stroke of the engine-piston. It will be observed that the air entering through the port *o* unites with and is mingled with the oil as it passes out of the mouth of the nozzle *e* into the mixing-chamber B, where the oil is further carbureted by the air admitted around the valve R as it is lifted from its seat. These two currents—to wit, the upper one of the mixed air and oil and the lower current of air—enter in opposite directions, and as they come in contact cause a whirl within the mixing-chamber, thereby obtaining an intimate mixture and a thorough car-

bureting of the oil as it is drawn forward to enter the cylinder through the receiving-valve D.

In the modification shown in Fig. 4 I provide an air-jacket *f* around the exhaust-pipe F and by pipe *f'* supply the annular chamber N, thereby more effectually heating the air supplied through the spraying-nozzle *e*. The valve R in this modification is provided with a cup *r*, into which any oil that trickles down the stem S may pass and out of the orifices *r'* around the base of the cup.

s represents orifices pierced through the valve R, so as to admit air-current to assist in spraying the oil to insure a thorough and minute division of the oil, and hence an intimate mixture of the oil and air.

The oil-tank U is of course supplied by a pipe U', connected to the main tank or reservoir.

V represents an overflow-pipe for conducting back the surplus oil into the main tank or reservoir.

W represents a throttle-valve for cutting off the supply of oil. The top T is secured upon the mixing-chamber by means of bolts *g*, so that the parts may be readily taken apart and put together. The mixing device is provided with a pipe extension *h* and is connected to the neck D' in the base of the engine-cylinder by bolts *i*.

Mode of operation: In order to start an engine, the mixer and oil-tank are preferably heated by a lamp or gas-burner until the oil and air are of sufficient heat to insure an intimate mixture of the explosive material, thus securing the initial explosion for starting the engine. The discharging of the hot gas from the cylinder maintains the heat in the mixing-chamber to secure the mixing and carbureting, heretofore explained, of the fuel-gases supplied to the explosion-chamber of the engine.

Having described my invention, what I claim is—

1. A heating and mixing device for an explosive-engine, consisting of an oil and air mixing chamber, one or more heating-chambers surrounding the same, connected respectively with the exhaust-pipe of the engine and a discharge-orifice, one or more air-jackets surrounding said heating-chamber, a valve between said air-jacket and the mixing-chamber, an oil-supply pipe, a valve in the same, having a discharge-nozzle into the mixing-chamber, an air-heating chamber communicating with said discharge-nozzle and means for actuating said air and oil valves, substantially as described.

2. A heating and mixing device for an explosive-engine consisting of an interior mixing-chamber, means for passing the exhaust products from the engine around the same, an air-heating compartment adapted to be heated thereby, an oil-supply pipe passing through the air-heating chamber into the mixing-chamber, a valve located in the discharge end of said oil-pipe, and an air-discharge orifice from said air-heating chamber disposed concentrically around the oil-discharge pipe, means for operating the said oil-valve whereby mixed air and oil are discharged into the mixing-chamber, substantially as specified.

3. A heating and mixing device for an explosive-engine, consisting of an interior mixing-chamber, a heating-compartment surrounding the same connected respectively with the exhaust-pipe of the engine and with the discharge-orifice, an air-heating jacket surrounding said heating-compartment, the said jacket having chambers under the mixing-chamber, an air-valve connecting said air-chamber with the mixing-chamber, an oil-supply pipe, a valve in said pipe adapted to discharge into the mixer, a heated-air passage communicating with the mixing-chamber and surrounding said oil-valve, the said oil-valve having a stem depending into the mixer and terminating above the air-valve whereby when the latter is raised, it will actuate the oil-valve, substantially as and for the purpose specified.

4. A heating and mixing device for an explosive-engine consisting of an interior mixing-chamber, a heating-compartment surrounding the same connected respectively with the exhaust-pipe of the engine and the discharge-orifice, an air-jacket surrounding the said heating-compartment and having a chamber under the said mixer, a valve between the said air chamber and mixer, an oil-supply pipe, a valve therein having a discharge-nozzle into the mixer, a secondary heating-compartment surrounding said oil-pipe, orifices connecting said secondary air-chamber with the said oil-discharge nozzle, and means for operating said valve, substantially as described.

5. A heating and mixing device for an explosive-engine, consisting of an oil-mixing chamber, a heating-compartment surrounding the same connected respectively with the exhaust-pipe of the engine and the discharge-orifice, an air-jacket surrounding said compartment having a chamber located under the mixing-chamber, an air-valve between said air and mixing chamber, an oil-supply pipe tapping into said mixing-chamber, a valve located in the same, an air-heating compartment surrounding the said discharge end of the oil-pipe, said valve having a stem depending through said oil-pipe into the mixer and terminating above the said air-valve whereby when the latter is raised the oil-valve will be actuated and heated air and oil will be supplied to the mixing-chamber, substantially as described.

6. A heating and mixing device for an explosive-engine, consisting of an oil-mixing chamber, a heating-compartment surround-

ing the same connected respectively with the exhaust-pipe of the engine and the discharge-orifice, an air-jacket surrounding said compartment having a chamber located under the mixing-chamber, an oil-supply pipe tapping into said mixing-chamber, a secondary air-heating chamber surrounding the said oil-pipe, an air-discharge nozzle for the same terminating in the mixing-chamber concentrically with the oil-pipe, a valve in the said oil-pipe, and means for tripping the said air and oil valves, substantially as described.

In testimony whereof I have hereunto set my hand.

FRANK VAN DUZEN.

Witnesses:
ED. C. BARLOW,
JOHN L. CRAWLEY.