No. 652,470. Patented June 26, 1900.

T. CASCADEN, JR. & T. C. MENGES.

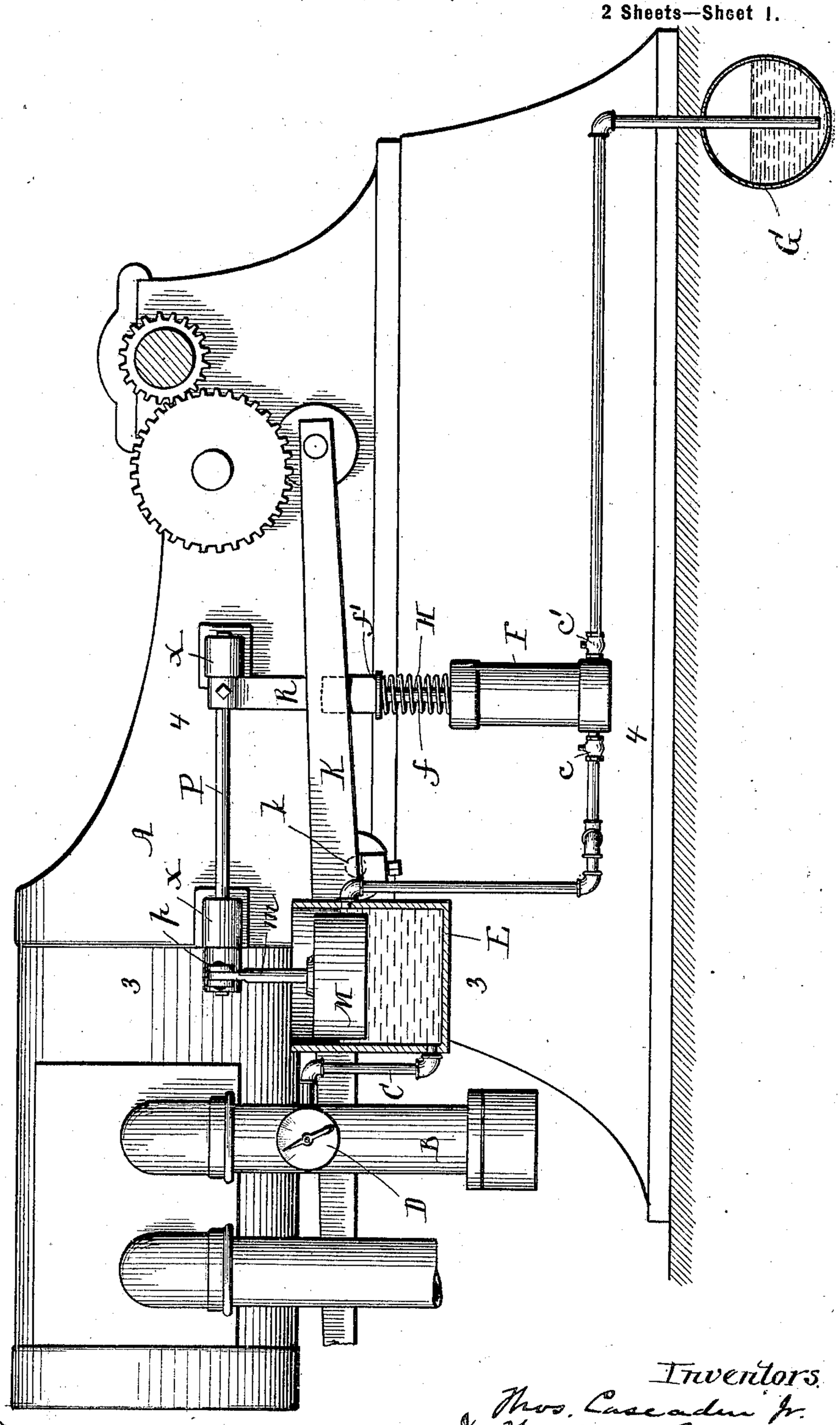
EXPLOSIVE ENGINE.

(Application filed July 13, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses:
Fred Gerlach
Oliver L. Dennis.

Inventors
Thos. Cascaden Jr.
& Theodore C. Menges
By Price & Fisher
their Attorneys.

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2 Sheets—Sheet 2.

Fig. 2.

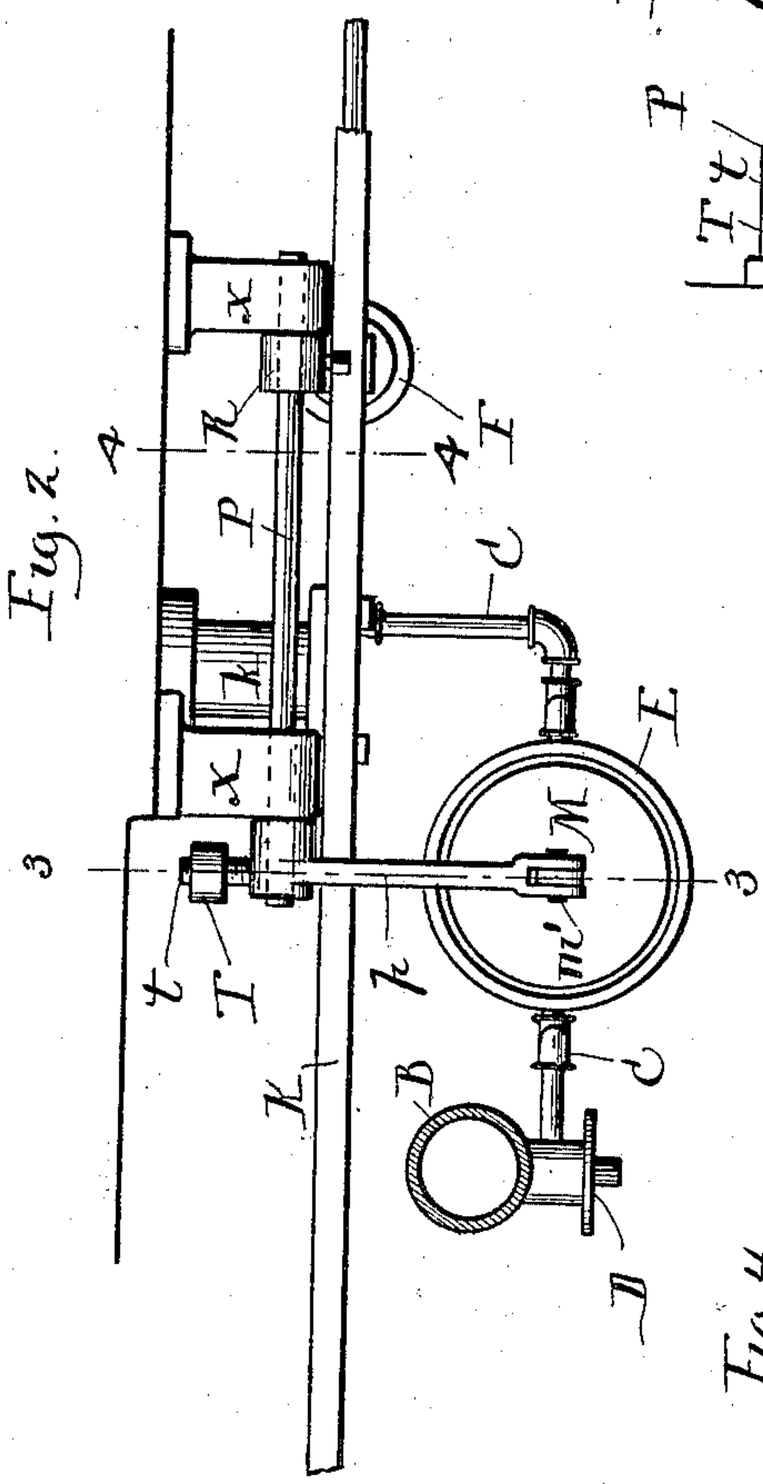


Fig. 3.

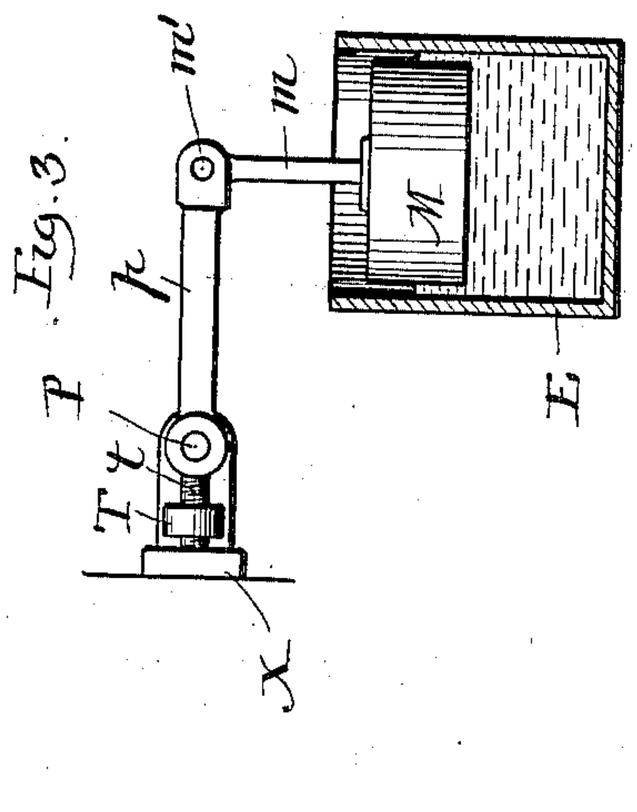
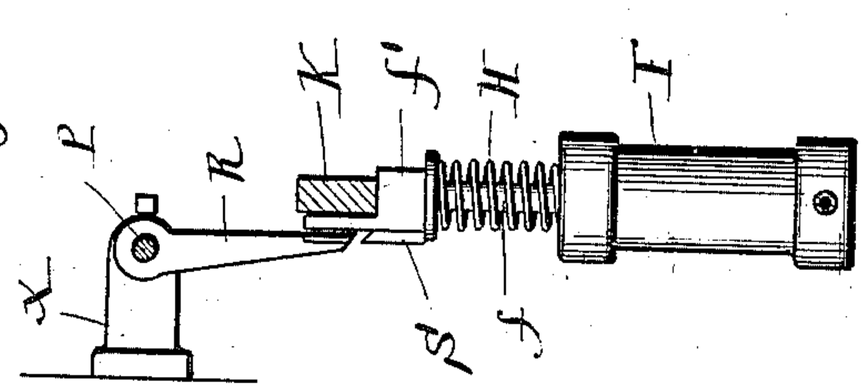


Fig. 4.



Witnesses:
Fred. Gilbert
Chas. L. Dennis.

Inventors.
Thos. Cascaden Jr. and
Theodor C. Menges
By Penn & Fisher
Their Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS CASCADEN, JR., AND THEODORE C. MENGES, OF WATERLOO, IOWA, ASSIGNORS TO THE DAVIS GASOLINE ENGINE WORKS COMPANY, OF SAME PLACE.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 652,470, dated June 26, 1900.

Application filed July 13, 1899. Serial No. 723,648. (No model.)

To all whom it may concern:

Be it known that we, THOMAS CASCADEN, Jr., and THEODORE C. MENGES, citizens of the United States, and residents of Waterloo, in the county of Black Hawk, State of Iowa, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a full, clear, and exact description.

This invention is directed to that class of engines in which gasolene or like volatile liquid is employed as a fuel.

The object of the invention is to provide a simple, cheap, durable, and effective means for supplying the gasolene to the engine and for automatically regulating the supply. This object of the invention is accomplished (and herein the invention resides broadly) in providing a supply-chamber into which the liquid fuel is delivered by a pump, said supply-chamber being furnished with suitable means whereby the height of liquid within said chamber shall serve to control the delivery of liquid thereto by said pump.

While the invention, broadly considered, may be embodied in a variety of ways, the preferred form of the invention is that hereinafter described, illustrated in the accompanying drawings, and particularly defined in the claims at the end of this specification.

Figure 1 is a view in side elevation of an explosive-engine having our invention applied thereto. Fig. 2 is a plan view on a reduced scale. Fig. 3 is a detail view, in vertical section, upon line 3 3 of Fig. 1. Fig. 4 is a detail view, in vertical section, upon line 4 4 of Fig. 1.

A designates the frame of the engine, to the valve-casing of which connects the usual air-admission pipe B. To the air-pipe B leads an oil-delivery pipe C, preferably through the medium of a throttle-valve D, this throttle-valve being of any usual or suitable construction and serving to regulate the flow of liquid from the supply-pipe C to the air-pipe B. Suitably interposed in the oil-supply pipe C is an oil-supply chamber E, the outleading section of the supply-pipe being shown as connected to the lower part of this chamber, while the intake-section of the supply-pipe C communicates with the upper part of the chamber. An oil-pump F is also interposed in the supply-pipe C at a point between the supply-chamber E and the main gasolene-tank G, and suitable check-valves *c c'* are arranged at each side of the oil-pump F in a manner well understood by those familiar with this class of apparatus. The piston of the pump F has its stem *f* encircled by a coil-spring H, that bears against the head *f'* of the piston-stem (or an interposed washer) and against the top of the pump-casing, the spring H serving to raise the piston and draw oil from the tank G into the cylinder of the pump. Across the head *f'* of the piston-stem extends the side lever K of the engine, this side lever serving to operate the admission and exhaust valve mechanism and being itself operated in a manner well understood by those familiar with this class of engines. Inasmuch, however, as the valve-operating mechanism forms no part of the present invention it has not been deemed necessary to particularly illustrate or describe the same, it being understood that the side lever K is mounted so as to have an oscillating movement about its pivot-point *k*.

From the construction as thus far defined it will be seen that as the side lever K is oscillated in an upward direction the pump-piston will be forced upward by the coil-spring H, thereby drawing oil from the supply-tank G into the cylinder of the pump, while as the side lever K descends the pump-piston will be depressed, thereby forcing oil from the pump-cylinder F to the supply-chamber E.

In order to control the action of the pump F, and consequently to regulate the amount of liquid fuel delivered thereby to the supply-chamber E, our invention contemplates providing some suitable means whereby the height or amount of the liquid within the supply-chamber E shall serve to control the operation of the pump. Preferably this result is accomplished by providing the supply-chamber E with a float-piston M, which serves, when the liquid fuel reaches the maximum height within the chamber E, to

throw the pump out of action. As shown, the stem *m* of the float-piston M is pivotally connected, as at *m'*, to one arm *p* of a rock-shaft P, this shaft being journaled in suitable brackets or bearings *x*, projecting from the side of the engine-frame. Rigidly connected with the rock-shaft P is a dogging-arm or check-arm R, the lower end of which is adapted to engage a stop S at the side of a head *f'* of the pump-piston stem. It will thus be seen that when the supply of liquid fuel within the chamber E reaches its maximum height—for example, as shown in Fig. 1 of the drawings—the float M will be so lifted as to rock the shaft P and bring the dogging-arm R above the stop F. Hence when the side lever K of the engine has forced downward the head *f'* of the piston-stem the end of the dogging-arm R will engage with the stop S and prevent the lifting of the piston and the further action of the pump until the supply of fuel within the chamber E has been so lowered as to cause the dogging-arm R to be withdrawn from engagement with the stop S. The coil-spring H will then cause the pump-piston to rise into the path of the side lever K and the pump will be again operated until the height of the liquid fuel within the chamber E shall again cause the action of the pump to be arrested. It will be understood, of course, that the liquid fuel is withdrawn from the supply-chamber E by suction as the air is drawn through the air-pipe B to the engine. In order to counterbalance the float-piston M, an adjustable counterbalance-weight T may be attached to the rock-shaft P, a convenient means for attaching this counterbalance T being by a threaded rod *t*, projecting from the hub of the arm *p*.

Manifestly it will be within the scope of the invention to employ other suitable means than the float-piston M, whereby the height of liquid within the supply-chamber shall limit the delivery of liquid to said chamber by the pump. The invention is designed to cover broadly not merely the use of such a float-piston or its recognized equivalent—viz., a movable diaphragm—but other suitable means whereby the height of liquid within the supply-chamber shall serve to limit the delivery of liquid thereto by the pump.

The advantages incident to the present invention will be at once recognized by those familiar with explosive-engines in which gasolene or like liquid fuel is employed.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an explosive-engine, the combination with a pipe for supplying liquid fuel to the engine and with a pump for delivering liquid fuel from a supply-tank, of a supply-chamber into which liquid fuel is delivered, a float-piston within said supply-chamber, means whereby the pump may be held out of action and suitable connections between said float-piston and the means by which the pump is held out of action, whereby when the liquid within said fuel-supply chamber has reached a predetermined height, the shift of the float-piston will cause the arrest of the pump.

2. In an explosive-engine the combination with the air-delivery pipe or conduit, a fuel-supply pipe leading thereto, and a pump for delivering the liquid fuel from a supply-tank, of a fuel-supply chamber arranged in said supply-pipe between the pump and the air-pipe, a dogging device for holding said pump out of action, a piston within said chamber and suitable connections between said piston and said dogging device whereby when the liquid has reached a predetermined height in said chamber the shift of the piston will cause arrest of the pump.

3. In an explosive-engine the combination with a liquid-fuel pump, of means for operating and controlling said pump comprising a moving part for shifting the pump-piston in one direction, a spring for moving said piston in the opposite direction, dogging or checking mechanism for preventing the shift of the piston by said spring, a supply-chamber into which liquid is delivered by said pump, and means controlled by the height of liquid within said chamber for bringing said dogging mechanism into action to arrest the pump.

4. In an explosive-engine, the combination with a liquid-fuel pump, of means for operating and controlling said pump comprising a moving part for shifting the pump-piston in one direction, a spring for moving said piston in the opposite direction, dogging or checking mechanism for preventing the shift of the piston by said spring, a supply-chamber into which liquid is delivered by said pump, a piston within said chamber and connections between said piston and said dogging mechanism whereby the rise of the liquid within said chamber shall cause said pump to be thrown out of action.

5. In an explosive-engine, the combination with a liquid-fuel pump, of means for operating and controlling said pump comprising a moving part for shifting the pump-piston in one direction, a spring for moving said piston in the opposite direction, dogging or checking mechanism for preventing the shift of the piston by said spring, a supply-chamber into which liquid is delivered by said pump, a piston within said chamber, a rock-shaft connected with said supply-chamber piston, and a dogging device connected to said rock-shaft and adapted to arrest the movement of the pump-piston.

THOMAS CASCADEN, JR.
THEODORE C. MENGES.

Witnesses:
IRA RODAMAR,
EMMA RODAMAR.