No. 677,767. Patented July 2, 1901.

# T. B. JEFFERY.

## HYDROCARBON SPRAYING DEVICE FOR GASOLENE ENGINES.

(Application filed June 14, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

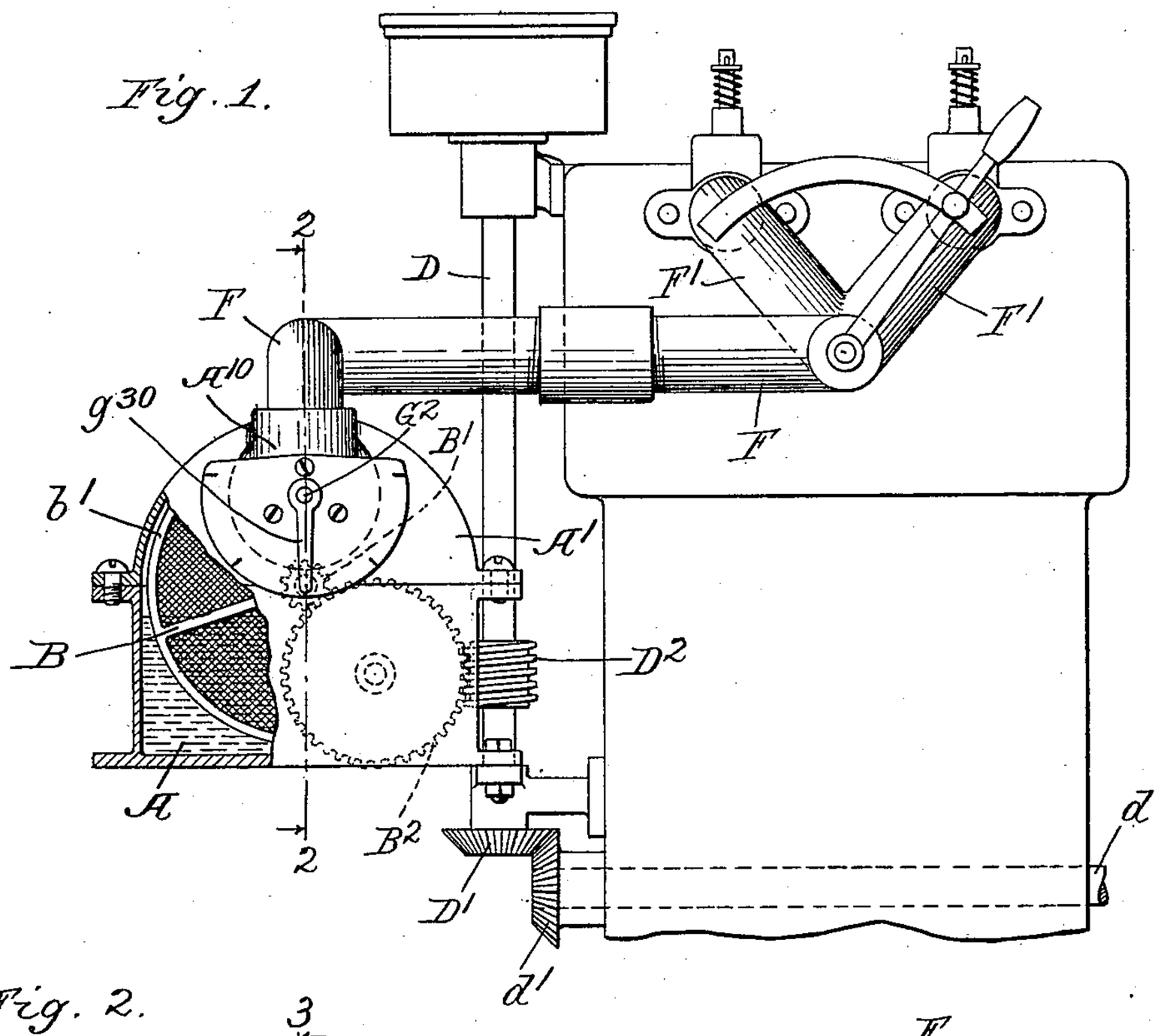



Fig. 2.

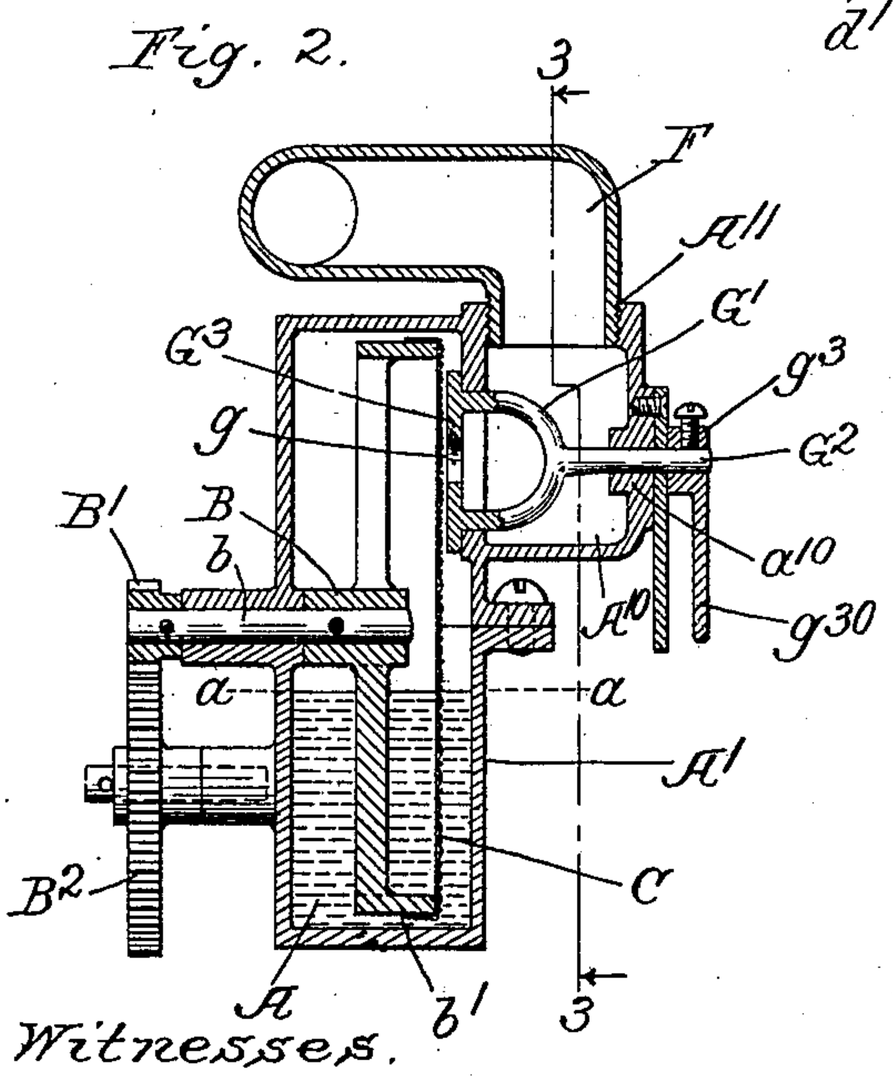
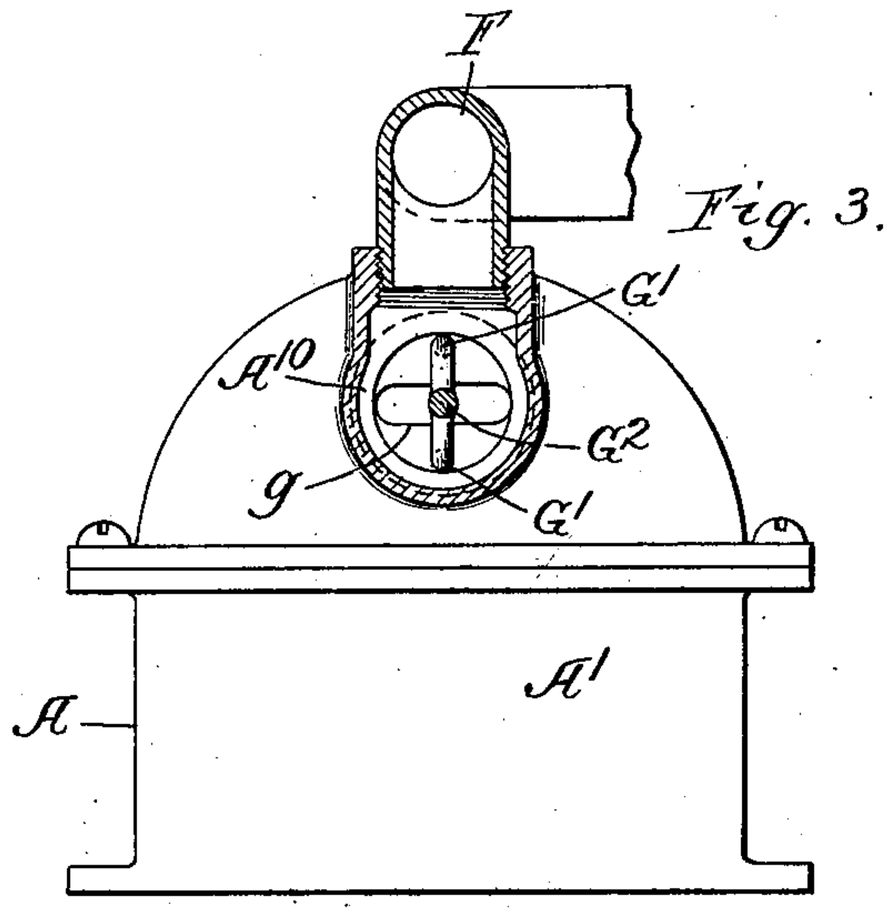



Fig. 3.




Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 4.

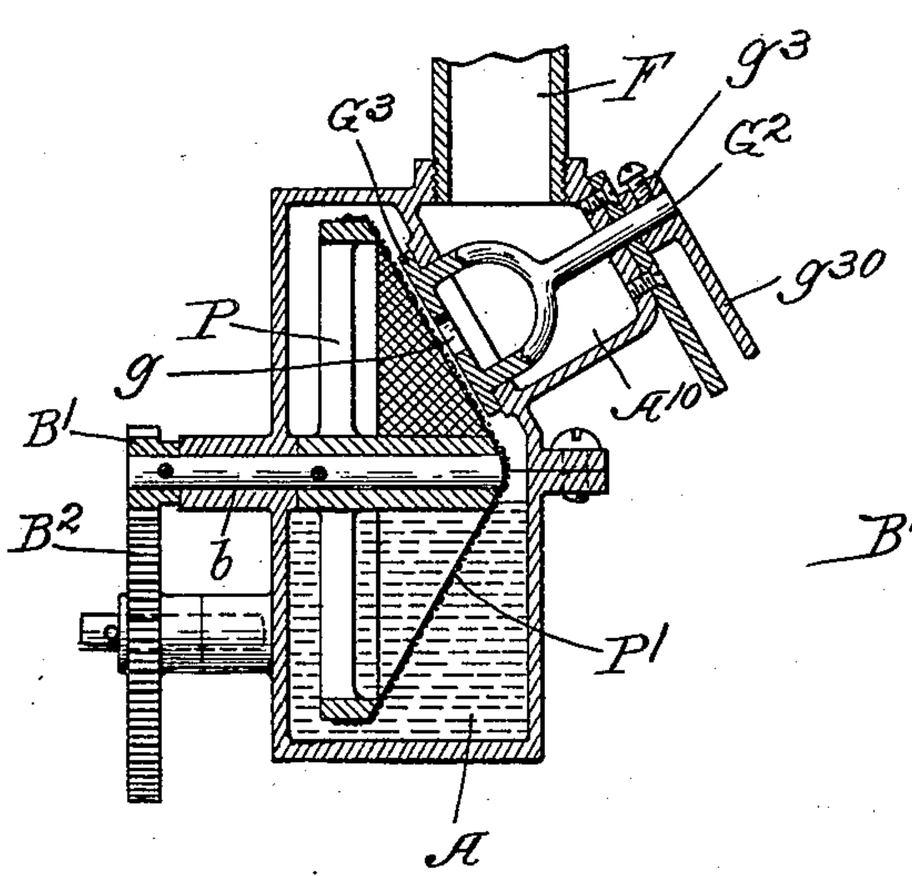



Fig. 5.

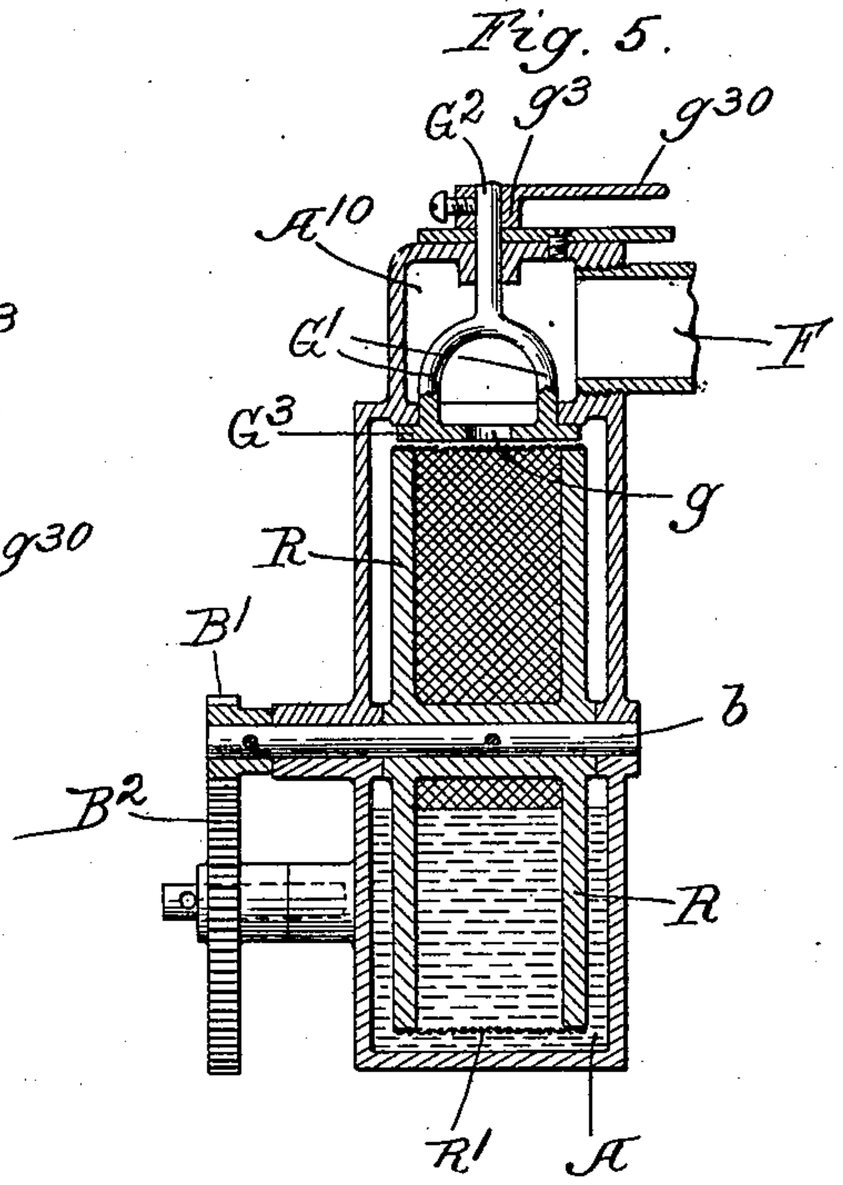



Fig. 6.

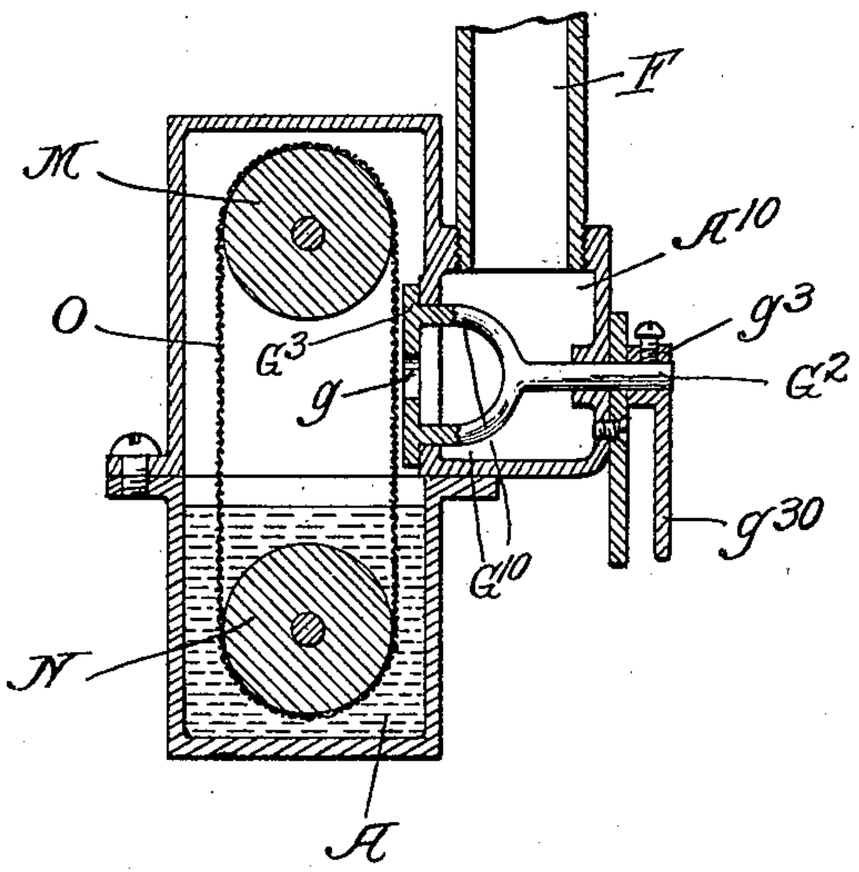
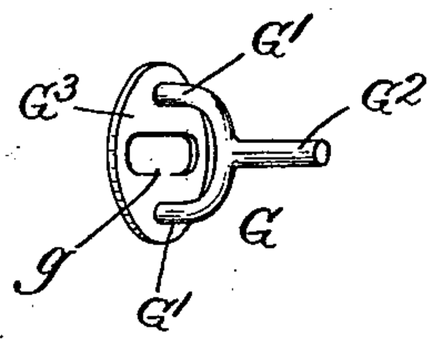



Fig. 7.




Witnesses.

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His Attys.

# UNITED STATES PATENT OFFICE.

THOMAS B. JEFFERY, OF CHICAGO, ILLINOIS.

## HYDROCARBON-SPRAYING DEVICE FOR GASOLENE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 677,767, dated July 2, 1901.

Application filed June 14, 1900. Serial No. 20,244. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS B. JEFFERY, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Hydrocarbon-Spraying Devices for Gasolene-Engines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings, Figure 1 is an end elevation of a portion of a gasolene-engine having my spraying device connected with it, a portion of the case of the latter being broken away to show the interior structure. Fig. 2 is a section at the line 2 2 on Fig. 1. Fig. 3 is a detail section at the line 3 3 on Fig. 2. Fig. 4 is a similar view to Fig. 2, showing a modified form of the spraying device. Fig. 5 is a view similar to Fig. 2, showing another modified form of the spraying device. Fig. 6 is a cross-section of a third modified form of spraying device. Fig. 7 is a perspective view of the mouthpiece.

I will describe first the particular form shown in Fig. 1. A is a chamber which is supplied with liquid hydrocarbon to any desired depth, as to the level *a a*. B is a skeleton wheel, disk, or spider fixed on a shaft *b*, which is journaled in one wall of the chamber A and protruding out of the same, having on its outer end a pinion B′, which meshes with a gear-wheel $B^2$, which is rotated in uniform time relation with the engine by means of any suitable train extending to the engine's main crank-shaft. A portion of this train, as illustrated, comprises the counter-shaft *d*, having a beveled gear *d′*, meshing with a beveled gear D′ on the upright shaft D, which carries the worm $D^2$, meshing with and driving said gear-wheel $B^2$. C is a capillary screen, of woven wire of fine mesh or other fabric adapted to hold liquid in its meshes. This screen is stretched over the face of the wheel or spider B, which has a marginal flange *b′*, adapted to afford attachment for the screen at the periphery of the latter. On the wall A′ of the chamber A which the screen C faces there is formed an exterior boss $A^{10}$, which is hollow, its cavity constituting a small chamber or passage opening into the cavity of the chamber A. Said boss $A^{10}$ has a lateral opening $A^{11}$, threaded to afford connection for a pipe F, which leads to the engine-cylinder, being suitably branched, as seen at F′ F′, to reach the two cylinders of a double-cylinder engine. G is a mouthpiece located at the mouth or opening of the cavity of the boss $A^{10}$ into the chamber A. It consists of a disk having spider-arms G′ G′, converging to the stem $G^2$, which extends at right angles to the plane of the disk and constitutes a shaft by which the disk is mounted and operated, said shaft extending out through the boss $A^{10}$, in which a journal-bearing $a^{10}$ is provided for it concentric with the opening of the cavity of the boss into the chamber A. Said opening is circular and affords a seat or journal-bearing for the mouthpiece, which has the flange or annular boss $G^3$ concentric with its stem, adapted to seat in said opening, the converging spider-arms G′ being rooted in and extending convergently from said flange. Outside the boss $A^{10}$ the stem $G^2$ is provided with a suitable stop-collar $g^3$, which is adjusted against the head of the boss, so as to hold the mouthpiece in its seat at the mouth of the boss, said collar having a handle $g^{30}$, which serves also as an index-finger, denoting the position of the mouth or aperture *g*, which is formed in the mouthpiece G. This aperture *g* is oblong and preferably elliptical, so that as the mouthpiece is rotated by means of the handle $g^{30}$ the dimension of said aperture standing radial to the axis of the rotating screen is shifted, changing gradually from the shortest dimension at the lesser axis of the ellipse to the longest dimension at the greater axis of the ellipse, thus gradually changing the width of the annular area or zone of the screen from whose interstices the liquid which is carried thereby is sucked or forced as the screen revolves past said aperture of the mouthpiece. It will be understood that suction is produced through the pipe F by reason of the action of the piston in the engine-cylinder to which the pipe is connected, tending to draw in air to said cylinder, and the mouthpiece standing in close proximity to the screen, the mouth or aperture through said mouthpiece being closed by the screen so long as the apertures of the screen are filled with the liquid, such suction tends to draw in air through the apertures of the

screen, thereby extracting the liquid from the same and discharging it in a spray in the air supplied to the engine's cylinder, as described. The operator by adjusting the mouthpiece is thus able to vary the amount of spray which is taken in at each impulse or sucking action, so as to vary the richness of the charge of mixed air and hydrocarbon which enters the explosion-chamber. The extent of the aperture in the mouthpiece in the direction in which the screen rotates does not materially affect the amount of hydrocarbon which is taken in at each impulse, because practically the apertures of the capillary screen are emptied of their liquid as fast as they pass the edge of the aperture in the mouthpiece, and the amount taken in therefore is determined by the speed of the rotation of the screen relative to the engine's action and the extent of the aperture in a direction radial to the axis of rotation of the screen. The wheel which carries the screen being geared to the main engine crank-shaft, operating in uniform time relation thereto, being faster when the engine is running at high speed and slower when the speed of the engine is less, but making always the same travel for each complete rotation of the crank-shaft, each discharge of hydrocarbon corresponds to the same number of degrees of rotation of the screen, and the discharges vary, therefore, as the adjustment of the mouthpiece changes the position of the mouth, causing a different dimension of such mouth to stand transverse to the direction of movement of the screen in its rotation past the mouth.

I do not limit myself to the screen in the form of a disk which rotates about its axis. It may be conical in form, as shown in Fig. 4, in which P is the wheel or spider and P′ is the screen, or it may be cylindrical in form, as shown in Fig. 5, in which R is the spider and R′ is the screen, or it may be in the form of an endless belt O, passing around two pulleys M and N, as shown in Fig. 6. In each form a suitable arrangement of mouthpiece will be adopted, so that the mouth shall face and stand as close as may be to the screen and be adjustable about an axis at right angles to the path of the screen at the point at which the mouthpiece faces the latter.

I do not limit myself to the particular form of aperture or mouth in the mouthpiece shown, though it is the most expedient to construct and adjust and for that reason is specifically claimed; but the essential feature of this aperture is that it has different dimensions in different directions, so as to be adjustable to change the dimension which extends transversely to the direction of movement of the screen past it. I do not limit myself, however, strictly to making the screen movable. It is only essential that there shall be relative movement as between the screen and the mouthpiece. Inasmuch, however, as it is more convenient and yields the more compact structure to make the screen the movable element, I have so shown it and claim this structure specifically.

I claim—

1. In a spraying device for the purpose stated, a capillary screen and means for charging it with the liquid to be sprayed; an air passage or chamber through or from which the engine is supplied with spray-charged air; means for causing air impulses through the air passage or chamber in uniform time relation with the engine's action, said passage or chamber having a mouthpiece whose mouth or aperture is non-circular and stands adjacent to the screen, such mouthpiece being movable to cause different dimensions of the mouth, at will, to stand transverse to the direction of movement of the screen past the mouth.

2. In a spraying device for the purpose stated, a capillary screen; means for giving it movement in the direction of its superficial extent and for charging it at one part of its path of movement with the liquid to be sprayed; an air passage or chamber terminating at one side of the screen, and having a mouthpiece whose mouth or aperture is non-circular and stands closely adjacent to the screen, such mouthpiece being movable to cause different dimensions of the mouth at will to stand transverse to the movement of the screen past the mouth.

3. In a spraying device for the purpose stated, a capillary screen and means for giving it movement in the direction of its superficial extent and for charging it at one part of its path of movement with the liquid to be sprayed; an air passage or chamber terminating at one side of the screen, and having a mouthpiece whose mouth or aperture is non-circular and stands adjacent to the screen; means for causing an air-current toward and into such mouth in impulses corresponding to the engine's action, such mouthpiece being movable to cause different dimensions of the mouth, at will, to stand transverse to the direction of movement of the screen past the mouth.

4. In a spraying device for the purpose stated, a capillary screen; means for giving it movement in the direction of its superficial extent and for charging it at one part of its path of movement with the liquid to be sprayed; an air passage or chamber having a mouthpiece whose mouth or aperture is non-circular and stands adjacent to the screen, such mouthpiece being rotatable about an axis at right angles to the path of movement of the screen past the mouth, said mouth being of different dimensions in different directions radial to said axis.

5. In a spraying device for the purpose stated, a rotating screen; a liquid-containing chamber into and out of whose liquid contents the screen passes as it rotates; an air passage or chamber having a mouthpiece intruded into the liquid-containing chamber,

above the liquid-level thereof, and having its mouth or aperture adjacent to the surface of the screen, such mouthpiece being rotatable about an axis at right angles to the path of movement of the screen past the mouth; and said mouth being of different dimensions in different directions radial to said axis.

6. In a spraying device for the purpose stated, in combination with a chamber adapted at its lower part to contain liquid to be sprayed, a rotating capillary screen and means for rotating it in such chamber to cause it to pass into and out of the liquid at the lower part and to expose the saturated portion above the liquid at the upper part of said chamber; an air passage or chamber leading through the chamber-wall, having its opening into the chamber facing the screen; a mouthpiece at such opening, having a mouth or aperture adjacent to the screen, such aperture being of different dimensions in different directions in a plane parallel with the plane of movement of the screen, such mouthpiece being movable to change its dimension in the direction of the movement of the screen past it.

7. In a spraying device for the purpose stated, a capillary screen; means for giving it movement in the direction of its superficial extent and for charging it at one part of the path of its movement with the liquid to be sprayed; an air passage or chamber, terminating at one side of the screen; a mouthpiece, controlling the communication of such air-passage with the chamber, and standing adjacent to the screen, the mouth or aperture through such mouthpiece being oblong in a plane parallel to the screen; and means for rotating the mouthpiece about an axis at right angles to said plane to change the direction of its respective dimensions relative to the direction of movement of the screen.

8. A spraying device for the purpose stated, comprising a liquid-containing chamber, a rotating screen which, at one part of its path of rotation, dips into the liquid in the chamber, the wall of the chamber facing the screen having a hollow boss whose cavity leads into that of the chamber; and an air-pipe connected laterally into such boss; a mouthpiece which stands adjacent to the capillary screen and controls the communication between the cavity and the boss, said mouthpiece having a stem extending out through the boss; the mouth or aperture in said mouthpiece having different dimensions along different lines radial to the axis of the stem, and an indicating device on the protruding extremity of the stem.

9. In a spraying device for the purpose stated, a rotating capillary screen; a liquid-containing chamber, into and out of whose liquid contents the screen passes as it rotates; an air-passage having a mouthpiece intruded into the chamber above the liquid-level thereof, and having its mouth or aperture adjacent to the screen, such mouthpiece being rotatable about an axis at right angles to the path of movement of the screen past the mouth, and such mouth being of different dimensions in different directions radial to said axis.

Chicago, Illinois, June 11, 1900.

THOS. B. JEFFERY.

Witnesses:
CHAS. S. BURTON,
ADNA H. BOWEN, Jr.