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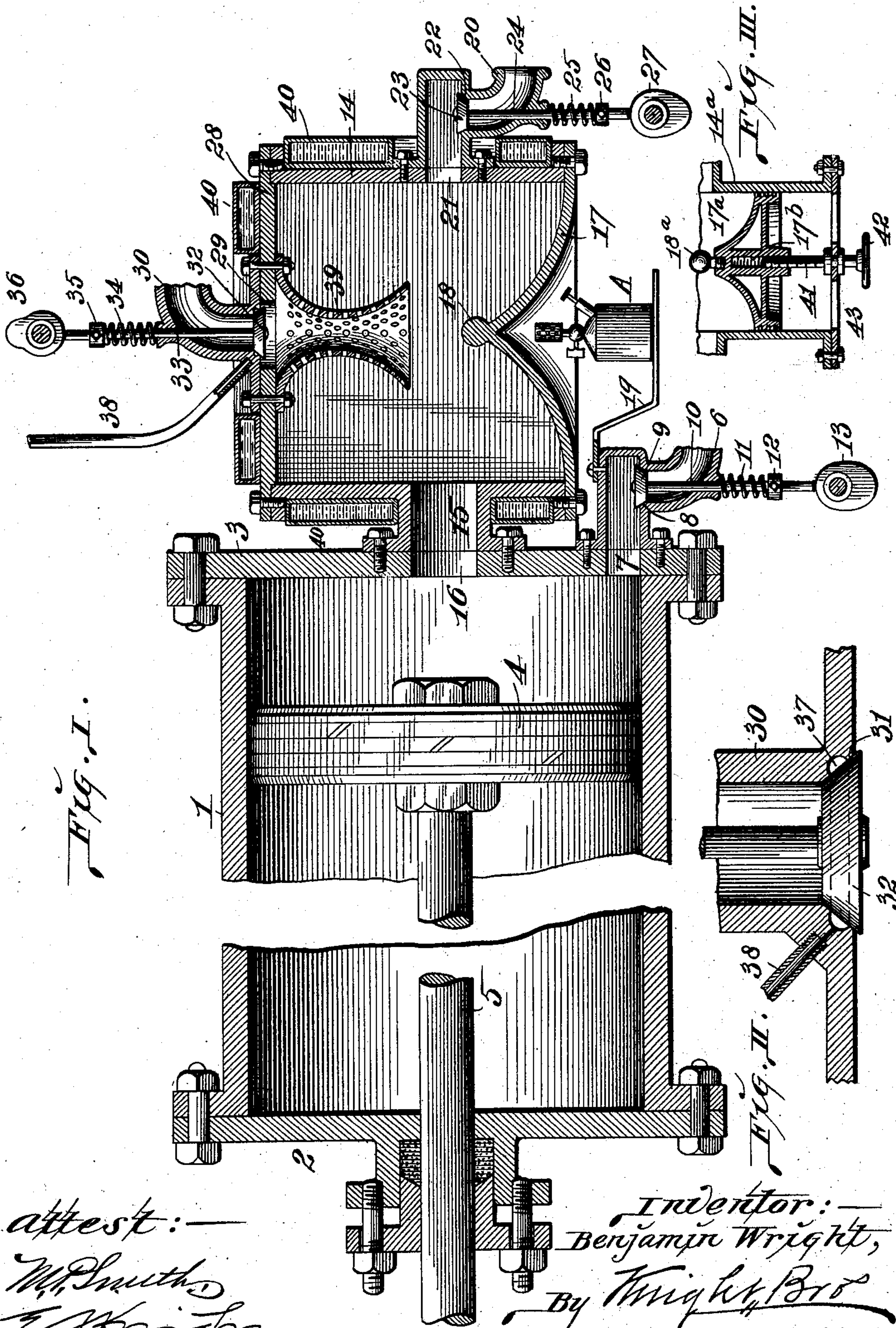
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EXPLOSIVE ENGINE.

APPLICATION FILED JULY 19, 1902.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

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## EXPLOSIVE-ENGINE.

**SPECIFICATION** forming part of Letters Patent No. 747,828, dated December 22, 1903.

Application filed July 19, 1902. Serial No. 116,169. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN WRIGHT, a citizen of the United States, and a resident of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of engines in which the motive force is obtained by the explosion of mingled oil-vapor and air, the present improvement having particular reference to the construction of a vaporizer for engines of the character named.

My invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a longitudinal section of my engine. Fig. II is an enlarged section of the vaporizer oil and air inlet and the valve by which said inlet is controlled. Fig. III is a section of a modification of the heat-diffusion cone of the vaporizer.

1 designates the cylinder of the engine, having the rear head 2 and the forward head 3.

4 is a piston that is carried by the piston-rod 5 and arranged to operate in the cylinder 1.

The parts thus far described may be of ordinary construction, as no invention *per se* is herein claimed for them.

6 designates an air-inlet pipe that has communication with the engine-cylinder chamber through an orifice 7 in the rear cylinder-head 3. The air-inlet pipe 6 is provided with a valve-seat 8, that is adapted to receive a valve 9, carried by a stem 10 and normally held to said seat by a spring 11 on the stem positioned between the shoulder of said inlet-pipe and an adjustable collar 12, secured to the stem. The valve 9 is designed to be unseated at intervals in the operation of the engine through the actuation of a cam 13, that is driven by suitable mechanism.

14 designates a vaporizer-cylinder that is provided with a tubular neck 15 to furnish communication between the engine-cylinder chamber and the vaporizer-chamber through an orifice 16, contained by the rear engine-

cylinder head, to which the vaporizer-cylinder is connected. At the bottom of the vaporizer-cylinder is a heat-diffusion cone 17, that is recessed at its lower side and suitably fitted and secured to the vaporizer-cylinder. The heat-diffusion cone 17 extends upwardly into the vaporizer-chamber and is provided at its apex with a knob 18. Beneath the heat-diffusion cone is a shelf 19, that is adapted to serve as a support for a heating lamp or burner, such as is shown at A, Fig. I, from which heat is imparted to the cone to be diffused or radiated therefrom within the vaporizer-chamber. The shelf 19 is preferably attached to the air-inlet pipe 6.

20 designates an exhaust-pipe attached to the vaporizer-cylinder and into which communication from the chamber of the vaporizer is obtained through an orifice 21 in the cylinder 14. The pipe 20 is provided with a valve-seat 22, that receives a valve 23, carried by a stem 24. On the valve-stem 24 is a spring 25, that is positioned between the shoulder on the air-inlet pipe 20 and an adjustable collar 26 on said stem. The valve 23 is adapted to be unseated by the actuation of a cam 27, that bears against the valve-stem and is mechanically operated to cause an unseating of said valve at intervals in the operation of the engine.

28 designates the upper head of the vaporizer-cylinder, which is provided with a central orifice 29.

30 is an air and oil inlet pipe attached to the upper vaporizer-cylinder head at the location of the orifice 29 therein and which is provided with a valve-seat 31, (see Fig. II,) that receives a valve 32. The valve 32 is carried by a stem 33, on which is a spring 34, that is positioned between a shoulder on the pipe 30 and an adjustable collar 35 on said stem. The valve 32 is adapted to be unseated at intervals in a similar manner to the valves 9 and 23 by the actuation of a mechanically-operated cam 36. At the base of the inlet-pipe 30 in the valve-seat 31 is an annular groove that constitutes an oil-receiving pocket 37, that is closed when the valve 32 is seated and which receives a supply of oil from an oil-conducting pipe 38.



39 designates a perforated distribution-tube suspended from the upper cylinder-head 28 within the vaporizer-cylinder and into which the oil and air entering through the pipe 30 pass. This tube 39 is located immediately above the apex of the heat-diffusion cone 17, and it is preferably of double-funnel shape to provide for the spreading of the oil and air that pass thereonto, so that rapid and efficient vaporization of the oil may be obtained in the vaporizing-chamber.

40 designates water-jackets placed upon the vaporizer-cylinder 14 and its head 28 for the purpose of maintaining a lowered temperature of the vaporizer-cylinder.

In the practical use of this engine the operation is as follows: Before starting the engine the vaporizer is heated by the lamp or burner A, located beneath it. Upon the first rearward stroke of the piston 4 in the engine-cylinder the valve 32 is unseated by the mechanical actuation of the cam 36, that bears against the stem of said valve. On the unseating of this valve the oil contained by the annular pocket 37 is permitted to flow therefrom and falls onto the distribution-tube 39. At the same time the air, which has been preferably previously heated, enters the vaporizer-chamber through the pipe 30 with the oil and mingles therewith. The valve 32 remains unseated during only a small portion of the stroke of the piston 4 in a direction away from the vaporizer, it being again seated through the medium of the spring 34 on the valve-stem after the point of the cam 36 has passed away from the stem. As the stroke of the piston continues the cam 13 is mechanically operated, and the engine air-inlet pipe 6 is opened by the unseating of the valve 9 to permit the ingress of air through said pipe to the engine-cylinder. As the oil and air enter the vaporizing-chamber and strike the distributing-tube 39 they pass downwardly through said tube and are vaporized by the heat ascending from the diffusion-cone 17 and the knob 18 at the apex of said cone, which heat ascending causes a heated condition of the distribution-tube to add to the vaporizing effect. On the completion of the rearward stroke of the piston 4 the valve 9 is seated by the action of the spring 11 on its stem. At this time the engine-cylinder is full of air and vapor that may have entered it from the vaporizer-chamber and the vaporizer is full of vapor and air. On the return or rearward stroke of the piston the air and vapor in both the engine-cylinder and vaporizer is compressed in the chamber of the vaporizer, and at the end of the stroke sufficient compression is obtained to cause the vapor and air to be exploded by reason of their contact with the heated knob 18 of the heat-diffusion cone and the distribution-tube 39. The explosion in the vaporizer creates

force to impel the piston away from the vaporizer again, furnishing the power by which the engine is operated. As the piston again moves toward the vaporizer the exhaust-valve 23 is opened by the mechanical actuation of the cam 27, and the products of combustion in the engine-cylinder and vaporizer are driven therefrom through the exhaust-pipe 20, the exhaust-valve being again seated at the completion of the stroke under the action of the spring 25. The momentum of the engine provides for the return forward stroke of the piston to admit air and oil, as before, and on its return rearward stroke the same action as that described is repeated.

By locating the exhaust-pipe and valve in connection with the vaporizer the products of combustion are thoroughly removed, and hence a greater proportion of pure air may be admitted into the engine-cylinder and vaporizer than is possible where the products of combustion are exhausted from the engine-cylinder chamber. This is a very necessary and important factor in the economical and efficient use of heavy oil in engines of the character herein described.

In Fig. III, I have shown a modification wherein the diffusion-cone 17<sup>a</sup> is adjustably mounted in the lower end of the vaporizer-cylinder 14<sup>a</sup>. The cone is provided with a screw-threaded bore 17<sup>b</sup>, that receives a screw-rod 41, provided with a hand-wheel 42, through means of which the diffusion-cone may be raised or lowered to place it nearer or more remote from the distribution-tube in the vaporizer-cylinder, as will be readily understood. The screw-rod 41 operates in a spider-head 43, applied to the lower end of the vaporizer-cylinder.

I claim as my invention—

1. In an explosive-engine, the combination with an engine-cylinder, of a vaporizing-cylinder having communication with said engine-cylinder, a cone at the bottom of said vaporizer-cylinder, means through which oil is introduced to said vaporizer-cylinder, and an oil-distributing tube located in the upper portion of said vaporizer-cylinder, and having a flaring lower end overhanging said cone, substantially as set forth.

2. In an explosive-engine, the combination with an engine-cylinder, of a vaporizing-cylinder having communication with said engine-cylinder, a cone at the bottom of said vaporizing-cylinder, means through which oil is introduced to said vaporizer-cylinder, and a perforated oil-distributing tube located in the upper portion of said vaporizer-cylinder, and overhanging said cone, substantially as set forth.

BENJAMIN WRIGHT.

In presence of—

E. S. KNIGHT,  
M. P. SMITH.