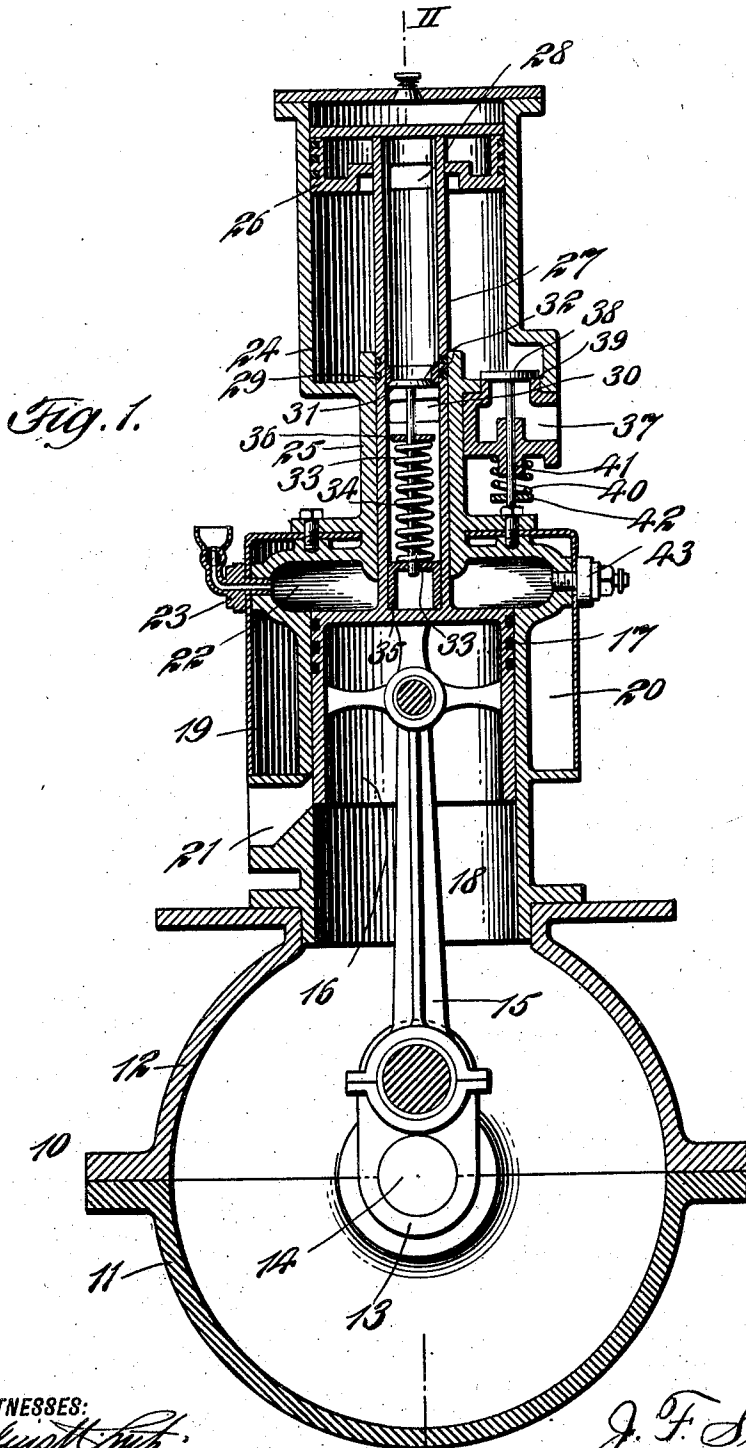


J. F. STAHL.
EXPLOSIVE ENGINE.
APPLICATION FILED MAY 15, 1908.

950,162.

Patented Feb. 22, 1910.

2 SHEETS—SHEET 1.



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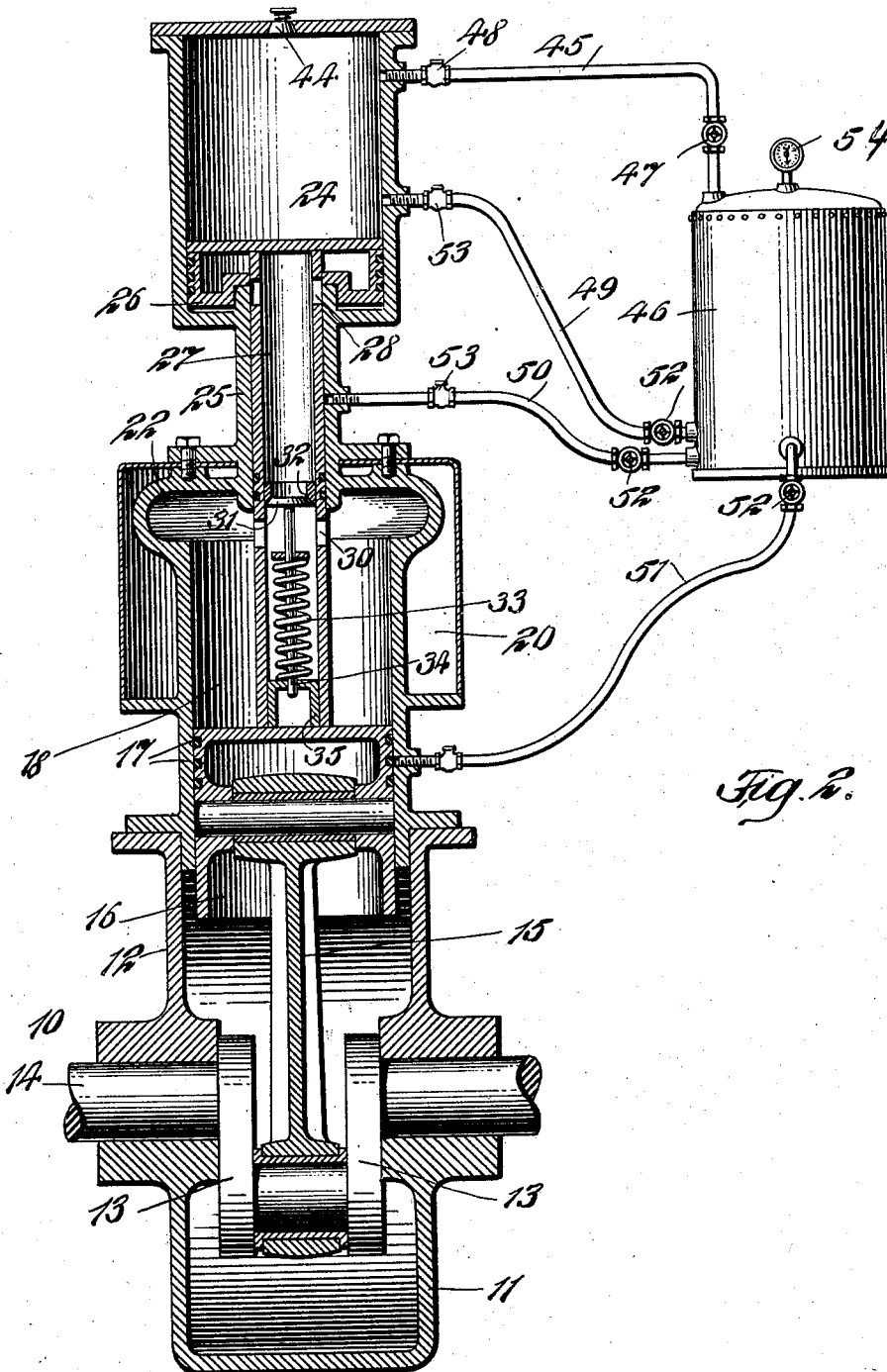


Fig. 2.

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JOSEPH FRANK STAHL, OF NEW YORK, N. Y.

EXPLOSIVE-ENGINE.

950,162.

Specification of Letters Patent.

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Application filed May 15, 1908. Serial No. 433,043.

To all whom it may concern:

Be it known that I, JOSEPH FRANK STAHL, a citizen of the United States, and a resident of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a full, clear, and exact description.

10 This invention relates more particularly to a two-cycle gasolene engine for use in connection with automobiles.

The primary object of the invention is to provide an engine having a single explosive cylinder in which the gas is compressed, and in which an explosion takes place at each stroke of the crank, thereby securing a two-cycle engine having substantially the same effect as a four-cycle engine so far as the compression of the gas is concerned, with the additional advantage of having the explosion at each stroke instead of every other stroke, thereby materially increasing the power of the engine.

25 Another object of the invention is to provide simple and efficient means whereby the pressure of gas in the cylinder before the explosion takes place may be increased to a greater extent when delivered than occurs in the usual two-cycle engine.

30 A further object of the invention is to provide means whereby the compression in the crank casing is eliminated and the contact of the gas with the oil therein avoided, and which is so constructed that the incoming gas to be exploded will force out the products of combustion of the former explosion, and assist in cooling the cylinder.

35 With these and other objects in view, the invention will be hereinafter more particularly described with reference to the accompanying drawings, which form a part of this specification, and will then be pointed out in the claims at the end of the description.

40 In the drawings, Figure 1 is a vertical section of one form of engine embodying my invention; and Fig. 2 is a vertical section taken on a line 11—11 of Fig. 1.

50 The crank casing 10 may be of the usual or of any preferred construction and may comprise the two members 11 and 12 suitably joined together, and adapted to be

inclosed within the same is the crank 13, the crank shaft 14 of which is journaled in bearings forming a part of the crank casing. 55 The crank 13 is connected by a rod 15 to a hollow piston 16 which is provided with suitable packing rings 17 and is adapted to reciprocate in the cylinder 18. The cylinder 18 is suitably supported on the crank casing 10 and may be provided with a jacket 19 60 around the same which forms a chamber 20 through which a cooling medium may be passed if desired for cooling the cylinder. The cylinder 18 is provided with an exhaust 65 opening 21, and at the upper portion thereof may be provided with an enlarged compressing chamber 22 in which the gas is adapted to be compressed prior to the explosion, and said cylinder may be provided 70 with a cup or other device 23 through which a lubricant may be made to pass into the cylinder, all of which parts may be of the usual or of any preferred construction.

To force the gas or explosive agent into 75 the chamber 22 under pressure, I provide a pumping cylinder 24. This pumping cylinder is arranged above the explosive cylinder 18, and is connected to said cylinder by a sleeve 25 or other means which may be 80 separate from or integral with the cylinders. The cylinder 24 may be of any suitable size relatively to the cylinder 18, and in the cylinder 24 is a piston 26 which is adapted to reciprocate therein. This piston 26 is 85 provided with the usual packing rings and may be hollow, and said piston 26 is connected to work in unison with the piston 16 by means of a tubular device or connection 27. The connection 27 is provided with one 90 or more inlet openings 28 at the upper part thereof which communicate with the interior of the cylinder 24, and said extension 27 may be provided with a suitable packing 29 to prevent leakage between said device and 95 the sleeve 25. The connection 27 is provided with a discharge opening 30, and between the opening 30 and the opening 28 is a valve 31. The valve 31 is normally forced against its seat 32 by means of a 100 spring 33 or otherwise, and this spring is arranged around the valve rod 34 and interposed between a bushing 35 and the wings 36. The pumping cylinder 24 is provided

with an inlet opening 37, and this opening may be connected to a carbureter or from which the mixture of air and gas or explosive agent may be drawn, and controlling the inlet opening 37 is a valve 38 which is normally forced against its seat 39 by means of a spring 40. The spring 40 may be arranged around a boss 41 and a collar 42 of the valve stem, and is adapted to permit the valve to be raised from its seat during the up-stroke of the piston 26, but which will become seated during the down-stroke of said piston. As will be seen during the up-stroke of the pistons 16 and 26, the latter piston will draw the explosive agent from the carbureter within the cylinder 24, and on the down-stroke of said piston will force the explosive agent through the opening 28 into the tubular connection or device 27 past the valve 31, and as soon as the opening 30 registers with the chamber 22 of the cylinder 18, the explosive agent will pass into said chamber 22 to be further compressed if necessary during the up-stroke of the piston 18. A spark plug 43 is provided in the chamber 22 or in any other desired location, and at the proper time ignites the explosive agent within the chamber and forces the piston 16 downward, thus forcing a new charge of the explosive agent into the tubular connection 27 to be discharged into the chamber 22 when the opening 30 again registers therewith. By this means the explosive agent is positively forced under the desired pressure into the explosive cylinder entirely independent of the crank casing, and the gas thus compressed will serve to clear the explosive cylinder of the products of combustion of the previous explosion, and by reason of the pressure in the chamber 22, the valve 32 will be forced to its seat to prevent the gas from again escaping back into the cylinder 24.

The parts of the engine may be automatically lubricated, or the pumping cylinder utilized for other purposes. As shown the cylinder 24 is provided with a check valve 44 at the upper part thereof, and leading from the cylinder 24 is a pipe 45. This pipe 45 leads to a tank or receptacle 46, and may be provided with a shut-off valve 47 and a check valve 48 to permit the air at each up-stroke of the piston to be forced from the cylinder into the tank 46. The tank may contain liquid or other means for cooling purposes to be supplied to the chamber 20 around the cylinder 18, or said tank may contain a lubricant. In this latter case a plurality of pipes 49, 50 and 51 are provided with a shut-off valve 52 and a suitable check valve 53, and may lead from the lower part of the tank to various parts of the engine so that the pressure of air within the tank will force the lubricant to any

part of the engine through the pipes, thus properly and automatically lubricating the parts of the engine. The tank 46 may have a suitable gage 54 indicating the pressure therein, and in addition thereto a relief valve may be provided to prevent the pressure from becoming too great.

From the foregoing it will be seen that a simple and effective two-cycle engine in which an explosion takes place at each rotation of the crank; that the gas may be positively drawn from the carbureter and forced under the desired pressure at the proper time to the explosive part of the cylinder, and that said engine may provide means for automatically lubricating the parts or for cooling the cylinder.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. The combination with an explosive cylinder, and a pumping cylinder, of pistons mounted in said cylinders, a tubular connection between said pistons provided with vapor inlet and outlet openings, means for supplying explosive vapor to said pumping cylinder on the side of the pump piston nearest the explosive cylinder, means for admitting air on the other side of the pump piston a storage tank, and a pipe connecting said pumping cylinder and said tank.

2. The combination with an explosive cylinder, and a pumping cylinder, of pistons mounted in said cylinders, a tubular connection between said pistons provided with vapor inlet and outlet openings, means for supplying explosive vapor to said pumping cylinder on the side of the pump piston nearest the explosive cylinder, means for admitting air on the other side of said pump piston, a storage tank, and a pipe leading from said pump cylinder to said tank.

3. The combination with an explosive cylinder, and a pumping cylinder, of pistons mounted in said cylinders, a tubular connection between said pistons provided with vapor inlet and outlet openings, means for supplying explosive vapor to said pumping cylinder on the side of the piston nearest the explosive cylinder, means for admitting air on the other side of the pump piston tank containing lubricant, a pipe leading from said pumping cylinder to said tank whereby a pressure is maintained in said tank, and pipes for conveying lubricant from said tank to various parts of said engine.

4. The combination with an explosive cylinder and a pumping cylinder, of pistons mounted in said cylinders, a tubular connection between said pistons provided with vapor inlet and outlet openings, a valve located in said connection between the inlet and outlet openings, an inlet for admitting explosive vapor to the pumping cylinder on

the side of the pump piston nearest the explosive cylinder, a valve operating in said inlet, an inlet for admitting air on the other side of the said pump piston, a storage tank, and a pipe connecting said pumping cylinder and said tank whereby the air may be conveyed from the cylinder to the tank.

This specification signed and witnessed this twelfth day of May, A. D. 1908.

JOSEPH FRANK STAHL.

Witnesses:

M. TURNER,
E. KRAMER.