

F. W. SEVERIN.
INSPIRATOR.
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1,065,971.

Patented July 1, 1913.

Fig. 1.

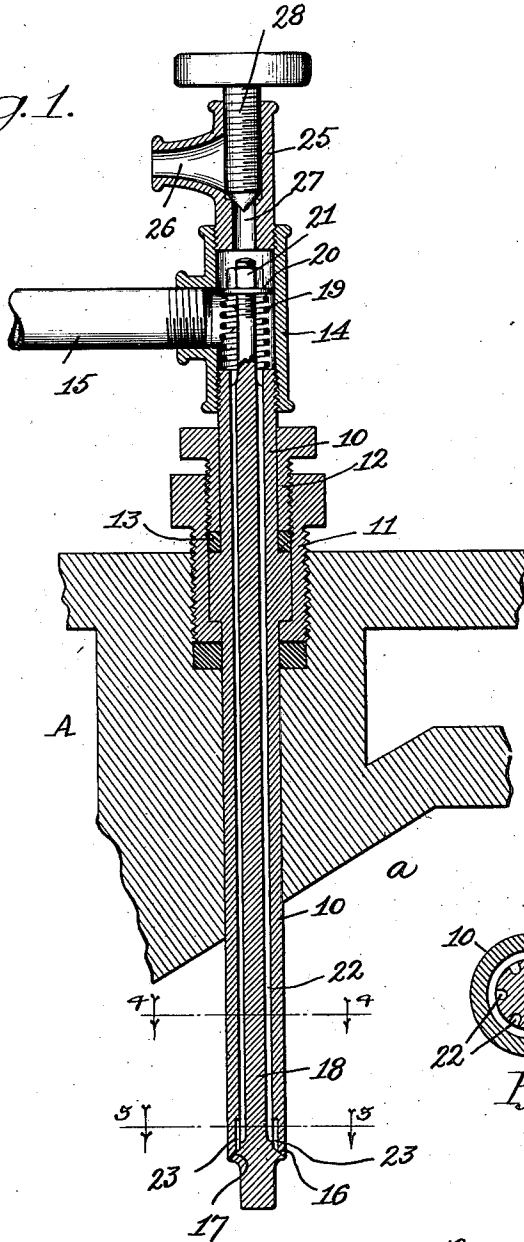


Fig. 2.

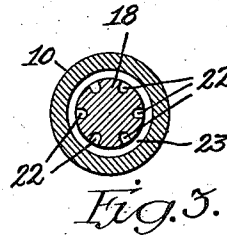
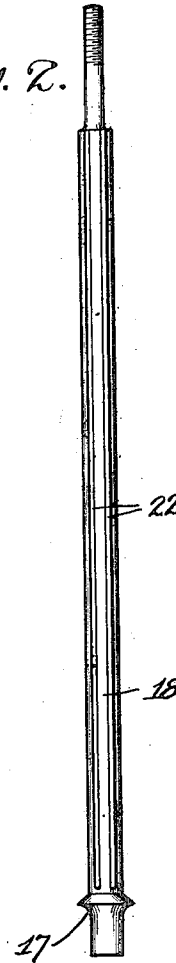


Fig. 3.

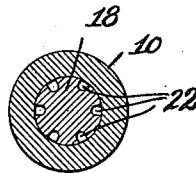


Fig. 4.

Witnesses:-

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UNITED STATES PATENT OFFICE.

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INSPIRATOR.

1,065,971.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANK W. SEVERIN, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Inspirators, of which the following is a full, clear, and exact description.

The invention relates to inspirators for internal combustion engines and by which the liquid fuel is supplied to the combustion chamber. In forcing liquid fuel into the combustion chamber of an engine, when a nozzle with a small hole is used, carbon forms in the small holes, due to the heat in the combustion chamber, and around the nozzle which discharges into said chamber.

The present invention designs to provide an improved inspirator by which the liquid fuel is divided into a number of capillary streams in transit to the combustion chamber, so that it will be heated and discharged in thin films, without causing carbon to form in the passages for the liquid-fuel, and to effect a thorough vaporization of the liquid in the combustion chamber, and also to provide means which will not affect the operation of the inspirator if any carbon should form at the point where the liquid fuel is discharged.

The invention consists in the novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings: Figure 1 is a central section of the improved inspirator, a portion of the combustion chamber of an engine being shown. Fig. 2 is a detail of the grooved stem for dividing the liquid fuel into a series of capillary streams. Fig. 3 is a section on line 3-3 of Fig. 1. Fig. 4 is a section on line 4-4 of Fig. 1.

A denotes a portion of an engine-cylinder around a combustion-chamber *a* of the type used for crude oil, in which air is previously compressed in the combustion chamber and liquid fuel is injected through the inspirator by a positively driven fuel pump. Since, however, the particular construction of the engine forms no specific part of the invention, fuller illustration has not been deemed necessary. The improved inspirator comprises an induction-pipe 10, which extends through the engine-casing and is secured therein by a plug 11 and a gland 12 between

which a packing ring 13 is interposed. The induction pipe extends through the cylinder-wall and its inner end is disposed in the combustion-chamber, so that it will be heated by the walls around the chamber and by the heat resulting from combustion in the chamber. The outer end of pipe 10 is connected to a coupling 14 to which is connected a fuel supply pipe 15 through which oil will be forced by a suitable pump, to and through the induction-pipe. The inner end of the induction-pipe through which the fuel is discharged into the combustion-chamber, is tapered as at 16, to form a flared seat for a valve or closure 17, which is secured to a stem 18 which extends longitudinally through the induction-pipe and is normally held in position to close valve 17, by a spring 19 disposed in the coupling 14 between the inner end of the induction-pipe and a washer 20 which is held by a nut 21 on the outer end of said stem. Resultantly, when the pressure of the liquid fuel from the supply pipe 15 is sufficient to overcome the force of spring 19, valve 17 will be opened and the liquid passing through the induction-pipe will be injected into the combustion-chamber. Stem 18 fits snugly in the bore of the induction-pipe and has a series of small longitudinally extending grooves 22 in its periphery which forms a number of small passages or ducts through which the liquid-fuel must pass in transit to the discharge end of the induction-pipe so that the liquid fuel will be thoroughly heated by contact with the heated pipe. Therefore, the liquid-fuel passes through the induction-pipe in a series of capillary streams and this fine division of the oil causes it to become thoroughly and uniformly heated as it is injected into and vaporized in the combustion-chamber. Adjacent the discharge terminal of the induction-pipe its bore is slightly enlarged as 23, to provide a discharge-opening or annular passage around the inner ends of grooves 22. When the capillary streams are forced out of grooves 22, the flared opening between the valve seat 16 and the tapered valve 17, the oil is injected into the combustion-chamber in thin films which result in effective vaporization and combustion when ignited in the combustion-chamber. In inspirators of this character as heretofore constructed it

has been the practice to inject the oil through a nozzle having one or more very small openings, but this construction resulted in a great amount of carbonization in the small holes and at the discharge end of the induction nozzle or pipe. In the improved inspirator embodying the present invention, this carbonization is efficiently overcome because the oil is discharged in thin films at a point where carbonization or decomposition usually occurs and furthermore if any carbon should form between the valve and seat at the end of the induction-pipe, the operation of the inspirator would not be materially affected because the spring would, none the less, permit the valve to open and the divided capillary streams in the grooves 22 to be injected in thin films between the valve and its seat.

A test-cock 25 is connected to the outer end of coupling 14 and is provided with a discharge nozzle 26, a port 27 and a screw-valve 28 for closing said port. This valve permits a test to be made whenever desired, to ascertain the amount of oil being pumped into the inspirator.

The invention thus provides an improved inspirator in which the liquid fuel passes through the induction-pipe in a series of fine capillary streams, the grooves through which the oil passes being heated, so that the oil will be thoroughly and evenly heated in transit through the inspirator. The valve at the discharge terminal of the induction-pipe through which the capillary streams pass deflect the divided streams into films as the oil issues from the induction-pipe, so that the inner end of the capillary grooves or passages are protected against the formation of carbon such as results when they are exposed to the combustion in the combustion chamber. Furthermore the working of the valve tends to prevent the formation of carbon at the inner end of the induction pipe and to protect the grooves, and if from any cause whatsoever, carbon should form either on the valve-seat or the valve, the operation of the inspirator will not be materially affected.

The invention is not to be understood as restricted to the details set forth since this may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

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

1. In an inspirator, the combination of an induction-pipe, extending into the combustion-chamber of an engine, means therein for dividing liquid into capillary streams, means for forcing liquid under pressure through said capillary streams, a coupling at the outer end of said pipe, and a test-cock connected to said coupling.

2. In an inspirator, the combination of an induction-pipe, a stem in said pipe, having longitudinally extending grooves therein for dividing liquid into capillary streams, a coupling at the outer end of said pipe, a pipe connected to said coupling for supplying liquid-fuel under pressure to the induction pipe, a test cock connected to said coupling and an automatically closing valve at the inner end of said induction pipe.

3. In an inspirator, the combination of an induction-pipe extending through the wall of an internal combustion engine and into the combustion chamber therein, a stem extending through said pipe, one of said elements having longitudinally extending grooves for dividing liquid fuel into capillary streams, means for supplying liquid fuel under pressure to said pipe, a tapered valve seat at the inner end of said pipe, and a valve connected to said stem and fitting on said seat, an annular space being formed in the other of said elements to conduct the fuel from the grooves to said seat.

4. In an inspirator, the combination of an induction-pipe extending through the wall of an internal combustion engine and into the combustion chamber therein, a stem extending through said pipe, having longitudinally extending grooves for dividing liquid fuel into capillary streams, means for supplying liquid fuel under pressure to said pipe, a tapered valve seat at the inner end of said pipe, and a valve connected to said stem and fitting on said seat, an annular space being formed in the pipe adjacent the inner end of said grooves and the valve seat to conduct the fuel from the grooves to said seat.

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Witnesses:

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