

June 23, 1925.

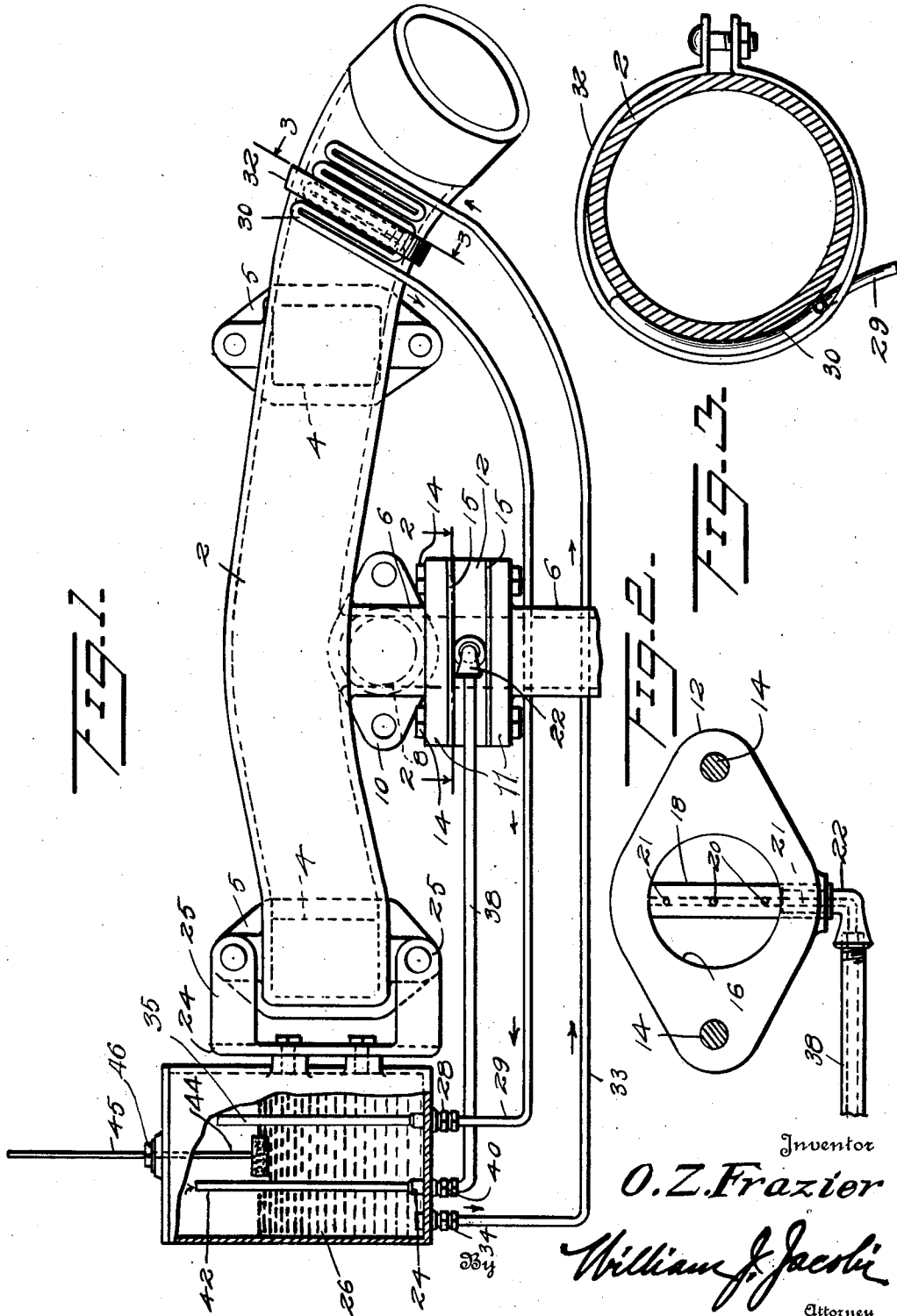
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O. Z. FRAZIER

HUMIDIFIER FOR INTERNAL COMBUSTION ENGINES

Filed July 7, 1922

2 Sheets-Sheet 1



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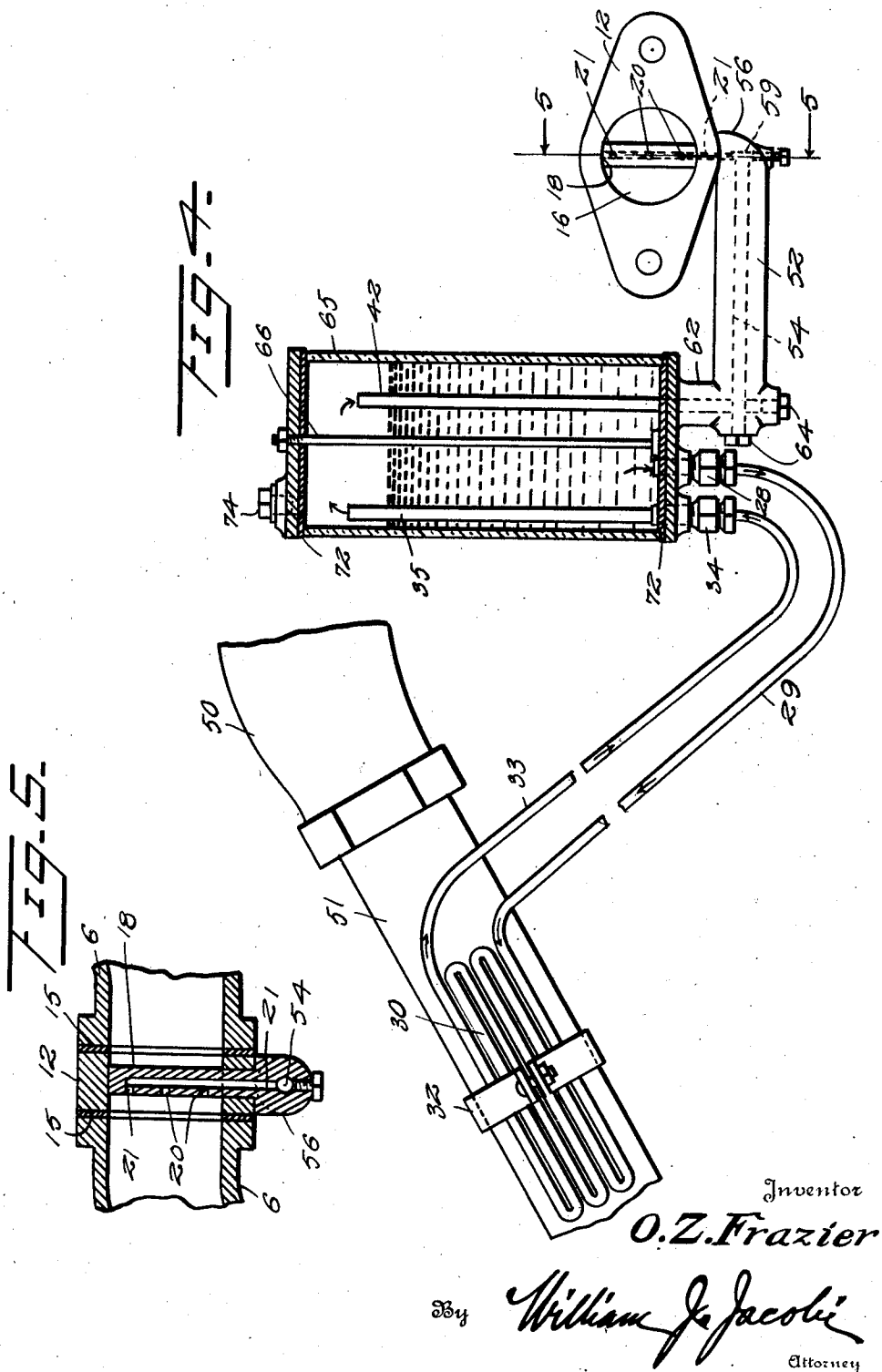
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE.

ORVILLE Z. FRAZIER, OF GRAND RAPIDS, MICHIGAN.

HUMIDIFIER FOR INTERNAL-COMBUSTION ENGINES.

Application filed July 7, 1922. Serial No. 573,450.

*To all whom it may concern:*

Be it known that I, ORVILLE Z. FRAZIER, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Humidifiers for Internal-Combustion Engines, of which the following is a specification.

The present invention relates to a device for converting water into vapor, and for conveying it to the hydro-carbon intake pipe of a gas engine at a point intermediate the carburator and the intake manifold to be ultimately discharged with the hydro-carbon vapor into the explosion chamber of the engine.

One of the principal features of this invention resides in a simple and compact water vapor generating apparatus for quickly and completely vaporizing the water, and which apparatus may be conveniently arranged on the motor frame or body of an engine of the ordinary type.

Further features reside in the particular construction and arrangement of the water tank, the vaporizing coil with its water conducting and vapor return tubes, the peculiar nozzle and jet steam or vapor discharge and the manner in which the latter is connected with the hydro-carbon intake pipe.

In the drawings:

Figure 1 is a view, partly in side elevation and partly in section of my improvement as applied to the intake and exhaust manifold of an internal combustion engine of conventional form,

Figure 2 is a horizontal sectional view taken thru a portion of the intake manifold on the line 2—2 of Figure 1,

Figure 3 is a section on the line 3—3 of Fig. 1.

Figure 4 is a view partly in side elevation of the improvement as applied particularly to engines of the Ford type.

Figure 5 is a section on the line 5—5 of Fig. 4.

It is well known, especially to those skilled in the construction and operation of internal combustion engines, that water vapor used in conjunction with the hydro-carbon vapor will not only provide a combustible mixture which results in a more smoothly running motor but will tend toward the prevention and elimination of carbon deposits on the spark plugs, on the walls

of the explosion chamber, the head of the piston and around the valves and valve seats, all of which detract from an efficiency of operation.

It is to overcome the objections above referred to that I have designed the present construction for injecting into the hydro-carbon vapor, quantities of steam or water vapor in amounts proportionate to the amount of hydro-carbon vapor which is taken into the explosion chamber.

Referring now more particularly to the accompanying drawings by numerals of reference 2 represents the exhaust manifold of an internal combustion engine of the ordinary type, having parts 4 in communication with the exhaust space of the engine and secured to the engine block thru the flanged supports 5. As this arrangement is well known, further description thereof is here unnecessary.

The vertical intake pipe 6 which extends upwardly from the carburator (not shown) communicates with the intake manifold at 8 thru a flanged joint 10, the particular construction of which as thus far pointed out being also well known in the art. Intermediate its connection with the carburator and with the intake manifold, the intake pipe 6 is divided and provided with a pair of joint flanges 11 which are spaced apart a distance sufficient to receive therebetween, an intermediate flange 12, all of which are clamped into a unitary structure, affording a continuous passage thru the intake pipe, thru the medium of bolts 14, gaskets 15 being interposed between mating faces of the flanged members.

Extending diametrically across the opening 16 in the flanged member 12, is a centrally bored nozzle 18, the bore of which is in communication with a series of jets 20 which open upwardly so that the vapor issuing from them will be entrained by the hydro-carbon vapor from the carburator. The bore of the nozzle 18, further communicates with a lateral opening 21 thru the side wall of the flange member 12, into which lateral opening is threaded or suitably secured a nipple 22.

Suitably mounted on the engine block, and preferably by a bracket 24 attached by arms 25 to the points of connection of the exhaust manifold supports 5, is a water tank 26 having connected with the bottom, and in communication with the interior

thereof, by a suitable form of joint 28, an outlet pipe 29 which leads to the exhaust pipe 2 where it is formed into a coil 30 clamped to the face of said pipe 2 thru the medium of a metal band or strap 32.

The return pipe 29 from the coil 30 is connected with the bottom of the tank 26 at 28 by a suitable form of joint, the pipe 29 being in communication with a tube 35 rising vertically within the tank and having its upper outlet above the normal level of the liquid. The arrangement thus far described permits the water conducted to the coil 30 by the outlet pipe 33 to become highly heated thru transference of heat from the exhaust pipe to said coil, the water being converted into steam, in which condition it is conducted by the return pipe 29 to the riser tube 35 from which it is discharged into the tank 26.

For the purpose of conducting the steam or water vapor from the interior of the tank 26 to the intake pipe leading to the intake manifold, I provide a tube 38 connected at one end with the nipple 22 and at the other end by a suitable coupling 40 with the bottom of the tank, said coupling having a threaded terminal extending upwardly thru the bottom of the tank, and onto which threaded terminal is screwed the lower end of a vapor inlet tube 42, the upper open end of which is normally above the level of the liquid.

It will thus be seen that during operation of the engine, upon every intake or suction stroke, a quantity of water vapor, proportionate to the quantity of hydrocarbon vapor will be drawn with the latter into the explosion chamber after first being intimately admixed therewith at its point of induction into the intake pipe 6.

For the purpose of indicating to the operator of the vehicle, the amount of water contained within the tank 26, I arrange therein, a float 44, the guide stem 45 of which passes upwardly thru an apertured collar 46 in the top of said tank. A filling opening closed by a plug is also provided, but not shown.

In the arrangement shown in Figure 3 the exhaust manifold is indicated at 50 and the exhaust pipe at 51, the water vaporizing coil 30 being substantially similar to that shown in Figure 1, but being arranged such that the coils extend longitudinally of the exhaust pipe 51 instead of transversely thereof, the specific manner of mounting the coil being within the choice of the owner of the vehicle or the mechanic who installs the device.

The principal distinction between the ar-

rangement shown in this figure and that in Figure 1 resides in the fact that in lieu of mounting the tank upon an independent bracket, I provide the water or steam intake duct in the form of tubular bracket 52 having a central longitudinal passage 54, one end of said bracket being formed with an elbow 56 communicating thru the lateral passage 59 with the lateral opening 21 in the flange member 12. A clean out plug 60 may be provided to afford access to said passages 59 and 12. At its opposite end, the tubular bracket 52 is provided with a lateral, upward tubular extension 62 in communication with the interior of the tank thru the vapor inlet tube 42, clean out plugs 64 being also provided to afford access to the passage in the lateral extension 62 and the bore of the bracket.

In the present embodiment, the tank is formed of a glass cylinder 65 clamped thru the medium of a central tie coil 66 between the head plate 68 and the bottom plate 70, which latter is preferably integral with the lateral extension 62 of the tubular bracket 52 altho such construction is not absolutely essential, it being necessary, however, that a rigid joint and waterproof connection be maintained at this point. Gaskets 72 are also arranged between the ends of the cylinder and the top and bottom plates and a filling opening 74 provided in the top plate.

The connection of the inlet and outlet tubes 33 and 29, the riser tube 35 and their respective connections with the tank shown in Figure 3 are substantially similar to the arrangement shown in Figure 1.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that variations in details may be made without departing from the spirit thereof.

What I claim as new and desire to protect by Letters Patent is:

The combination with an internal combustion engine and a water tank supported adjacent the exhaust manifold thereof, a conduit including two substantially parallel legs communicating with the water tank and an intermediate portion formed with a series of communicating U-shaped parts, all of which and the adjacent ends of the parallel legs being curved longitudinally to embrace the exhaust manifold, a clamp encircling the exhaust manifold and engaging the intermediate portion, and a steam conducting pipe leading from the water tank to the intake manifold of the engine.

In testimony whereof I affix my signature.

ORVILLE Z. FRAZIER.