Nov. 17, 1925.

1,562,375

I. H. SPENCER

GAS ENGINE

Filed Aug. 26, 1921

2 Sheets-Sheet 1

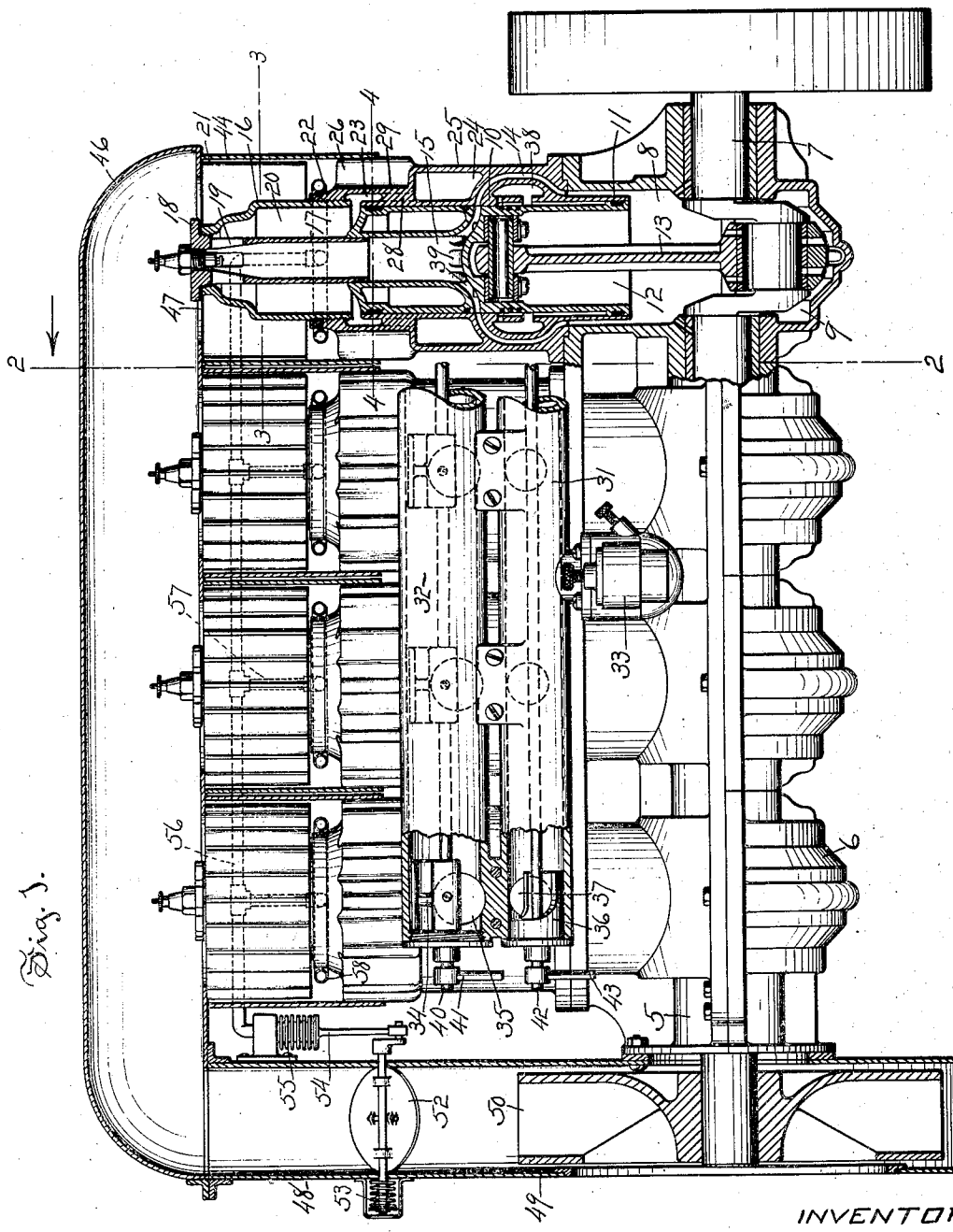


Fig. 1.

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Fig. 3.

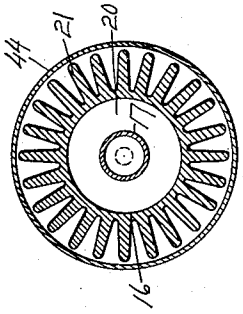


Fig. 4.

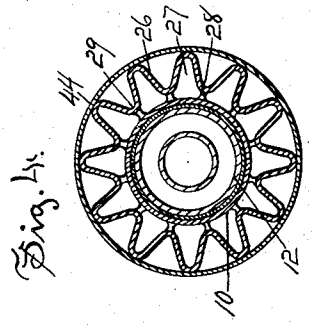
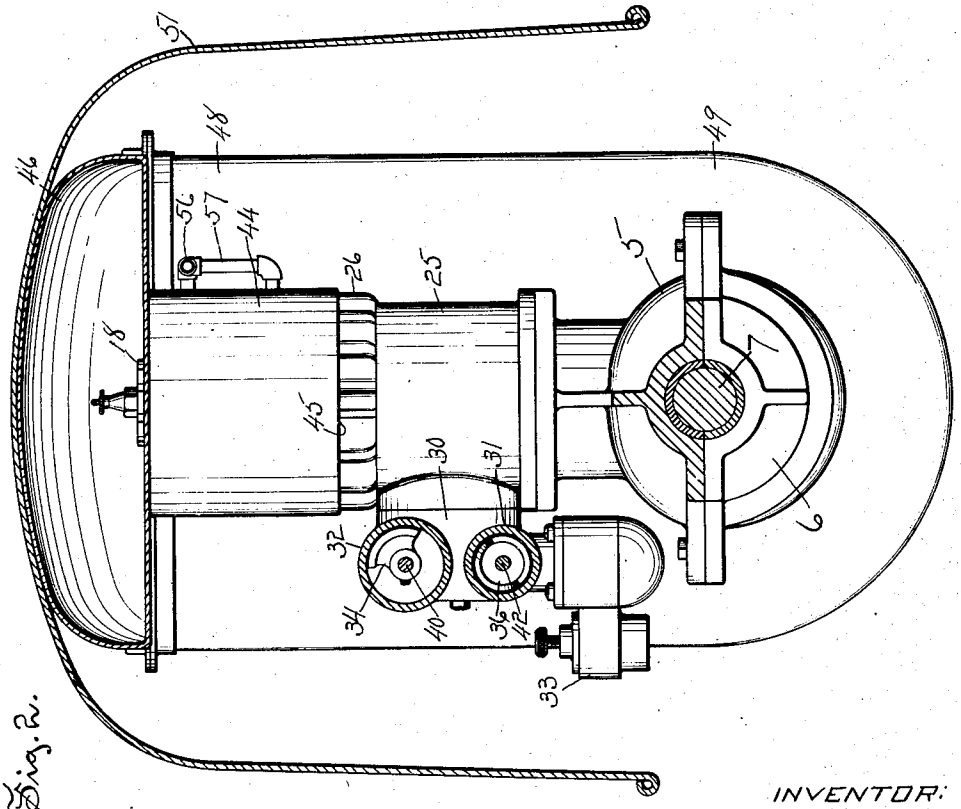


Fig. 2.



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UNITED STATES PATENT OFFICE.

IRA H. SPENCER, OF WEST HARTFORD, CONNECTICUT.

GAS ENGINE.

Application filed August 26, 1921. Serial No. 495,517.

To all whom it may concern:

Be it known that I, IRA H. SPENCER, a citizen of the United States, and a resident of West Hartford, in the county of Hartford and State of Connecticut, have invented a new and Improved Gas Engine, of which the following is a specification.

My invention relates to that type of engines in which a combustible fluid is introduced within the cylinder and there ignited thus creating a force to drive the piston, and an object of my invention, among others, is to provide an engine of this type with particularly simple and effective means for preventing excessive rise of temperature in the operation of the engine.

One form of engine embodying my invention, and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation of my improved engine with parts broken away to show construction, the hood being omitted.

Figure 2 is a view in section on a vertical plane denoted by the dotted line 2—2 of Figure 1.

Figure 3 is a view through one of the cylinders on a horizontal plane and as denoted by the dotted line 3—3 in Figure 1.

Figure 4 is a similar view on the plane denoted by the dotted line 4—4 of Figure 1.

In the accompanying drawings the numeral 5 indicates the base of my improved engine that may be formed in any desired manner and that may be provided with any suitable means for supporting it, as on the frame of a motor vehicle. A bottom cap 6 is secured to the under part of the base to close the chamber therein and the base may be provided with any suitable means for supporting a crank shaft 7 that may be provided with any ordinary means for connecting it with the driving shaft of the vehicle. The base is provided with cylinder openings 8 communicating with or forming a part of an inlet compression chamber 9 in the crank case or base, and cylinders 10, in the construction herein shown, four in number, are secured to the base with cylinder extensions 11 thereon projecting downwardly into the openings 8.

A piston 12 located in each of the cylinders is connected by a pitman 13 with a crank on the crank shaft, a port 14 extending from the chamber 9 to a port leading to a central opening 15 in the upper part of the cylinder, the special type of engine illustrated herein being of the two-cycle type and the construction shown comprising the subject matter of a copending application filed by me April 10th, 1920, of Serial Number 372,998, and for which reason a more detailed description is omitted herein, it being sufficient to state that the upper part 16 of the cylinder is separately formed from and secured to the lower part as by means of interengaging screw threads, as shown in Fig. 1 of the drawings.

A direction tube 17 extends downwardly from a tube supporting cap 18 secured within the upper end of the part 16, said tube having ports 19 in its side walls for the flow of gases into the chamber 20 in the cylinder. The wall of the tube 17 is thickened at its upper end where ignition takes place, this thickening being for the purpose of obviating an accumulation and retention therein of undue heat and such as might otherwise produce premature explosions, the ports 19 being located in this thickened portion of the direction tube.

The heat within an internal combustion engine is generated in the cylinder or cylinders at a point above the piston when it is down, and in a two-cycle engine, of the type herein shown, at a point above the exhaust outlet. Therefore, if the temperature of this upper part of a cylinder be kept below the danger point, that is the point below which injury by reason of such heat will take place, the engine will not become overheated. I have, therefore, devised means whereby the upper portions of the cylinders within which the heat is generated may be kept at such temperature as to remove practically all danger from overheating under normal conditions of operation.

In order to effect this purpose I construct each cylinder with such uniformity on all sides to a point below the combustion chamber that arcs of certain lengths of each cylinder will be duplicated all around. The object of this is to distribute the metal evenly at all points around the combustion chamber and for some distance below it so that even heating and cooling will take place at all of such points. The upper part of each cylinder is constructed for unobstructed access of a cooling medium, as air, to all

parts of the outer surface of the cylinders and also for a free circulation of such cooling medium lengthwise along that part of the outer surface of the cylinders surrounding the combustion chamber, and for such distance below said chamber as may be desired.

To effect this purpose I provide radiating fins 21 extending from the top of a cylinder downwardly to such point as may be desired, in the construction herein shown these fins being secured to and preferably formed integrally with the adjustable part 16 of the cylinder and extending downwardly to a position in proximity to the upper end of the lower part of the cylinder structure, it being understood that where the description herein is with reference to a single cylinder structure that such description is intended to apply equally to each of the other cylinder structures. The upper end of the cylinder part 16 is reduced in size and the fins 21, as to their inner edges, conform to this shape of said upper end, but the outer edges of the fins are preferably vertical.

The cylinder structure comprises an inner case constituting the cylinder part 10 and a jacket spaced from said cylinder, which jacket I term a cooling jacket, the upper and preferably reduced part 22 containing an exhaust passage or passages 23 opening into an exhaust chamber 24 in the jacket base 25.

In order to increase the cooling effects on the exhaust gases I provide substantially evenly spaced hollow fins 26 projecting radially from the jacket part 22 with cooling chambers 27 therein, which chambers open from the exhaust passages 23, all of said chambers and passages opening downwardly into the exhaust chamber 24. Struts 28 may be employed to connect the inner bends 29 of the hollow fins with the cylinder part 10.

The jacket base 25 is preferably enlarged, it being noted that all of the changes in size of the cylinder structure from the top downward are concentric and in the form of enlargements, so that the downward air flow will impinge upon said enlargements and thus make thorough and even contact with the entire cylinder structure from below the exhaust chamber to the top. Said base 25 has an inlet and exhaust box 30 projecting from one side, to which an inlet manifold 31 and an exhaust manifold 32 are connected, said manifolds communicating with a suitable source of supply, as a carbureter 33 and with a discharge (not shown herein).

The exhaust manifold is provided with retarder valves 34 located opposite the exhaust ports 35 and preferably spaced a slight distance from the mouths of said ports, and shut-off valves 36 are provided for a portion of the inlet ports 37, the shut-off valves being for the purpose of directing all of the gas into a portion only of the cylinders when the supply of such gas is reduced, as when the engine is "idling". This overcomes, by supplying each of the operating cylinders with enough gas to insure ignition at each stroke, the objectionable misfiring at such times. These valves may be secured, as to each set, to a single valve operating rod extending through the manifolds, in the construction shown a retarder valve operating rod 40 having an operating handle 41 supporting the retarder valves that are each adjustably secured thereto, and a shut-off valve operating rod 42 having a handle 43 supporting the shut-off valves.

The inlet chambers in the boxes 30 open into inlet chambers 38, each having an annular passage opening into a compression chamber 9 and controlled by the piston 12, that also controls the piston port 39 leading to the opening 15 in the piston. This control by the piston of the inlet and exhaust port to and from the cylinder will be readily understood by those versed in two-cycle engine construction.

A shell 44 envelops the upper part of each cylinder structure and extends from the top downwardly to a point below the top of the fins 26 thereby leaving openings 45 between the fins and the bottom edge of the shell 44 and the top edge of the base 25 for the free circulation of air lengthwise along the cylinder at all points above its periphery.

An air tube 46 extends along and overlies the tops of the cylinders with openings 47 through the bottom of said tube into the shells 44, a tube 48 extending from a housing 49 to the tube 46 to conduct air from a fan 50 to the tube 46. As the action of a fan upon currents of cold air is more effective than it is upon currents of hot air, owing to the greater denseness of the colder air, I take advantage of this feature by placing the fan so that it takes the cold air and blows it through the air tubes, thereby delivering a maximum amount of air through said tubes.

A hood 51 of any desired form and construction may be employed to cover the engine as a whole, it being especially noted that the tube 46 with the cold air flowing therethrough covers the top of the engine and delivers such cold air separately to each cylinder.

It is well known that the action of a gas engine is much more effective when the temperature is raised to a certain point and that the greatest efficiency is obtained in such engine when the temperature is maintained at that point. I effect this purpose in my improved engine by providing the air tube 48 with a damper 52 normally held in its closed position as by means of a spring 53, which damper is connected by a damper actuating rod 54 with a thermo-

stat 55 of well known construction and comprising a "bellows" case that is connected by a tube 56 and branches 57 with regulating tubes 58 surrounding each of the cylinders, preferably near the lower part of the combustion chamber therein. These regulating tubes are filled with some liquid, as ether, alcohol, or the like, that will boil at a certain temperature, which boiling will expand the thermostat 55 and thereby control the opening of the damper 52. When the temperature of the cylinder reduces sufficiently the boiling will cease and the contraction of the thermostat will close the damper.

In accordance with the provisions of the patent statutes I have described herein the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative, and that the invention may be carried out by other means and applied to uses other than those above set out.

I claim:

1. An engine comprising a cylinder having a concentrically arranged exhaust passage opening from the bottom of the combustion chamber, hollow fins evenly spaced about the cylinder with the spaces in said fins opening into said exhaust passage, and a shell surrounding said hollow fins and terminating above the bottoms thereof to provide openings at the bottom from each of the spaces between the fins for free circulation of air downwardly through said spaces.

2. An engine comprising a cylinder having a concentrically arranged exhaust passage opening from the bottom of the combustion chamber, hollow fins evenly spaced about the cylinder with the spaces in said fins opening into said exhaust passage, a series of radiating fins located above said hollow fins, and a shell surrounding said radiating fins and said hollow fins, but terminating above the bottom of the latter, whereby passages for the free circulation of air downwardly between said fins and out the bottom of the spaces between said hollow fins is provided.

3. An engine comprising a cylinder having a concentrically arranged exhaust passage opening from the bottom of the combustion chamber, hollow fins evenly spaced about the cylinder with the spaces in said fins opening into said exhaust passages, a shell surrounding said hollow fins and terminating above the bottom of the spaces between the fins to provide a passage for free circulation of air from the top downwardly and out at the bottom of said passages, and means for forcing air downwardly into the spaces between said hollow fins.

IRA H. SPENCER.