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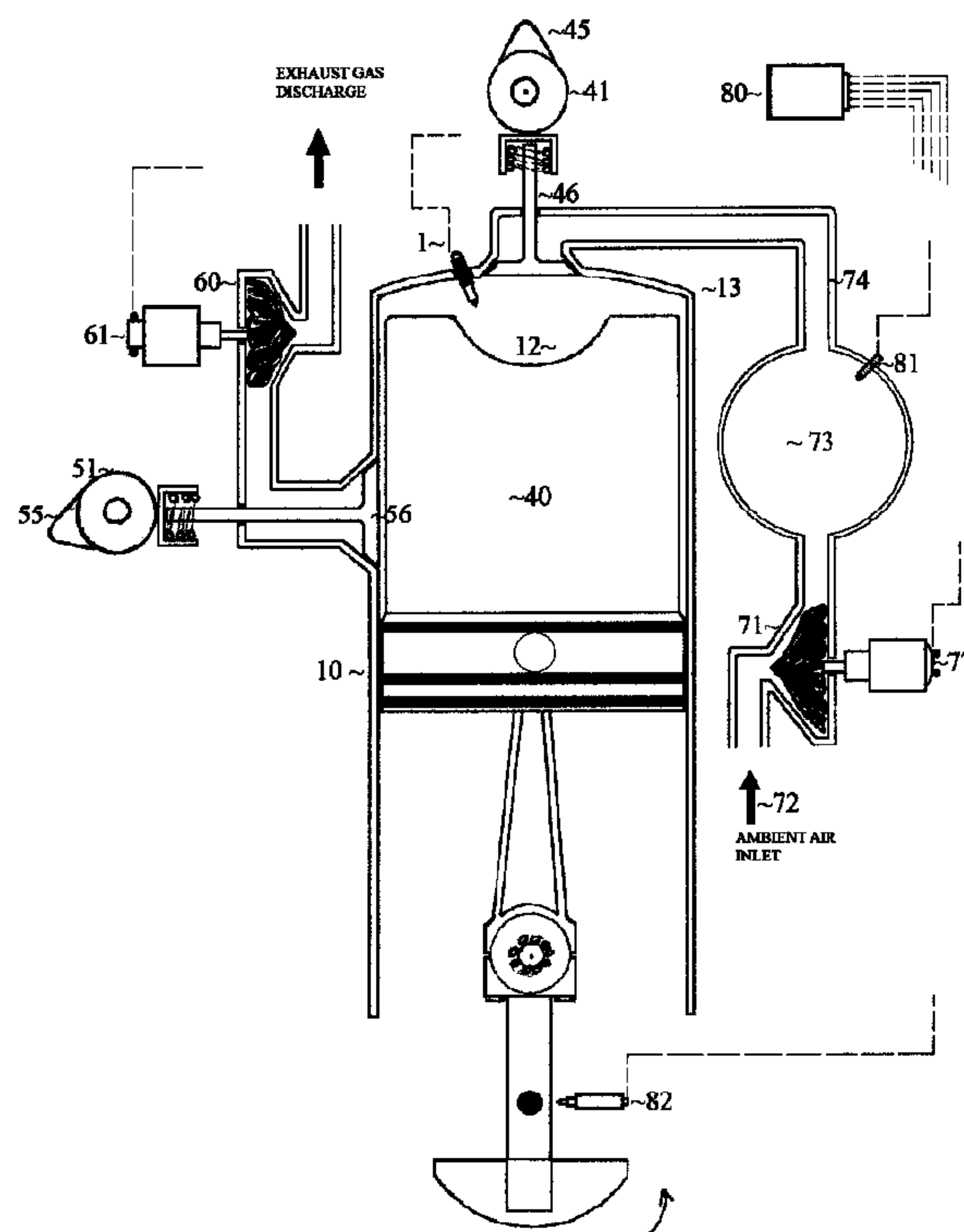
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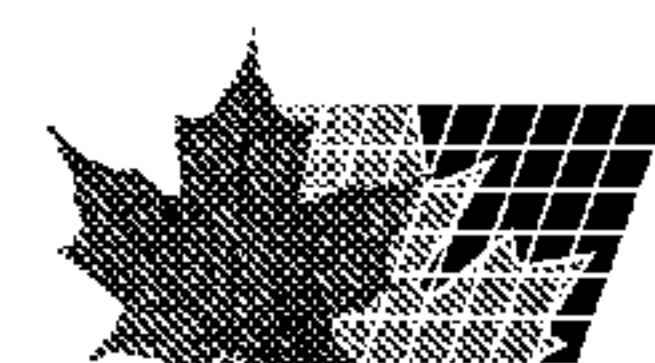
(54) Titre : MOTEUR A DEUX TEMPS AVEC SYSTEME DE LUBRIFICATION ORDINAIRE

(54) Title: TWO STROKE ENGINE WITH REGULAR LUBRICATION SYSTEM



(57) Abrégé/Abstract:

This is a proposal for a two-stroke engine that incorporates advantages of both the two-stroke and four-stroke types of engines. The engine is lubricated exactly like a four-stroke engine; it has piston rings that lubricate the piston and the cylinder, i.e. the oil control ring, as well as all the customary lubricating parts such as the oil pan with the oil pump and the oil distribution system. The engine uses two camshafts, one for the intake valve and the other for the exhaust valve. The engine has a compressor, powered by the engine battery to compress ambient air before it enters into the combustion chamber. Additionally, the engine has an exhaust powered turbine connected to an alternator, which provides additional power for the engine battery. The engine is equipped with one or plurality of fuel-injection nozzles. The piston is of the two step type, which reduces friction between the piston and the cylinder. The operation of the engine is controlled by a computer, the Engine Control Unit (ECU).



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ABSTRACT

This is a proposal for a two-stroke engine that incorporates advantages of both the two-stroke and four-stroke types of engines. The engine is lubricated exactly like a four-stroke engine; it has piston rings that lubricate the piston and the cylinder, i.e. the oil control ring, as well as all the customary lubricating parts such as the oil pan with the oil pump and the oil distribution system. The engine uses two camshafts, one for the intake valve and the other for the exhaust valve. The engine has a compressor, powered by the engine battery to compress ambient air before it enters into the combustion chamber. Additionally, the engine has an exhaust powered turbine connected to an alternator, which provides additional power for the engine battery. The engine is equipped with one or plurality of fuel-injection nozzles. The piston is of the two step type, which reduces friction between the piston and the cylinder. The operation of the engine is controlled by a computer, the Engine Control Unit (ECU).

DESCRIPTION

The cycle begins when the ignition key is turned to the start position and the electric motor (Fig 1. ~77) starts to drive the compressor (~71) which drives the fresh ambient air into the compressed air chamber (~73). The pressure sensor (~81) delivers the information to the ECU (~80) which, when the pressure in the compressed air chamber (~73) reaches a certain defined amount, turns the engine over, thereby starting the operation of the engine. Initially, the start phase lasts a few

seconds, but in subsequent engine starts, that phase is shorter as there is already some pressure in the compressed air chamber (~73). Compressed ambient air enters the cylinder (engine is turning), in the top piston position the intake and the exhaust valves are closed and the pressure necessary for ignition is achieved. The injector (~1) injects the fuel into the compression area (~12) and the air-fuel mixture is ignited. Pressure pushes the piston (~40) down. Just before the piston reaches the bottom position, the exhaust valve (Fig 2. ~56) is opened, exhaust gases leave the cylinder driving the exhaust turbine (~60), which in turn drives the alternator (~61) that charges the battery, which, in turn, is mostly used to run the electric motor (~77) and the compressor (~71). A moment later, but still before the bottom piston position, the intake valve (Fig 3. ~46) is opened. Ambient air enters the cylinder but exhaust vent (~56) is still opened for a brief moment so that last remaining exhaust combusted mix is pushed out with some of the fresh ambient air. Exhaust vent (~56) closes at the bottom position of the piston and as the piston moves up the intake valve (Fig 4. ~46) closes as well, allowing the piston to compress the fresh ambient air into the compression area (~12). This cycle repeats indefinitely while engine operates. The ECU continuously monitors the rpm through an rpm sensor (~82), pressure in the air compression chamber (~73) through a pressure sensor (~81), and the charge level in the battery thereby creating optimal conditions for engine operation.

The piston has a unique form: the lower part has rings (Fig 5. ~42) that lubricate and seal the piston to the cylinder, while the upper part above the rings (~41) is slightly narrower than the cylinder, and it that upper part it never touches the cylinder walls. The size of the volume of the upper part is intended to provide for enough pressure in the combustion chamber. The wrist pin could be placed in the upper part of the piston (~42), which would allow for a shorter engine.

There is an alternative, cheaper variant, which like a traditional two-stroke engine brings air into the crankcase. The advantage of this variant is that it would not need a compressed air chamber (~73), and the compressor (~71) and the exhaust turbine (~60) would be smaller and cheaper. The disadvantages are that a more expensive form of lubrication, such as dry-sump, would be necessary, and that the overall engine operation would be less efficient, leading to higher operating costs.

The traditional lubrication system used in four-stroke engines has proven to be the most effective solution to the problem of lubricating the moving, mechanical-power generating parts of an internal combustion engine. Until now this system was not available for two-stroke engines. The proposed

engine combines the best features of both the two and the four-stroke types of engines: lubrication system is simple and effective as in the four-stroke, the exhaust is clean as in the four-stroke, and for the same displacement the proposed engine would have more than twice the power.

The proposed engine is described above in its diesel version, but with minor modifications it can be made into a gasoline one. The gasoline version would use a direct fuel-injection system (NO carbureted version is possible), and would have a smaller compression ratio.

CLAIMS

The proposed two-stroke engine design achieves the best properties of both the two and the four-stroke types of engines: 1) lubrication system is simple and effective, 2) the exhaust is cleaner than traditional two-stroke, and 3) for the same displacement as the four-stroke it has more than twice the power.

DESCRIPTION

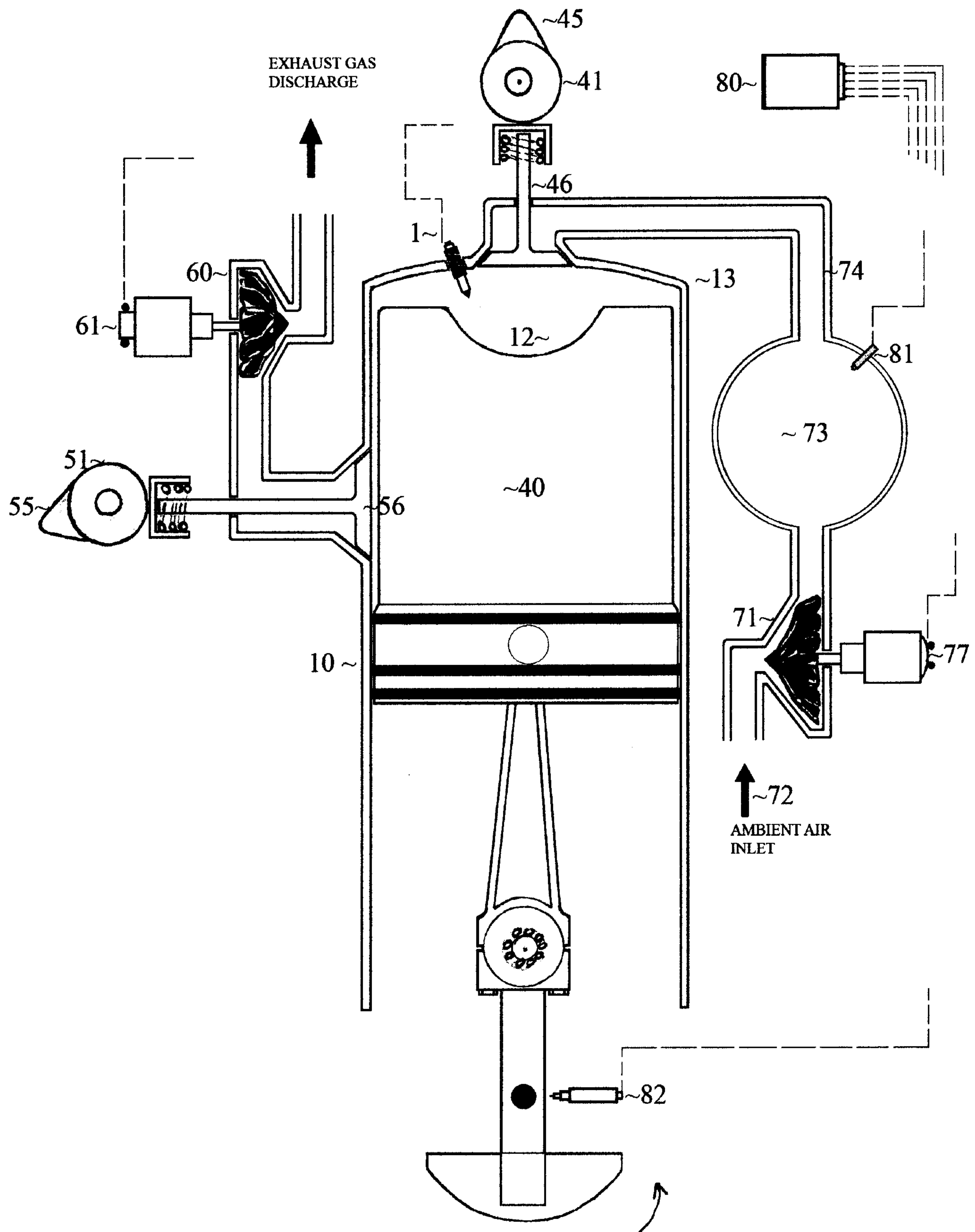


FIG. 1

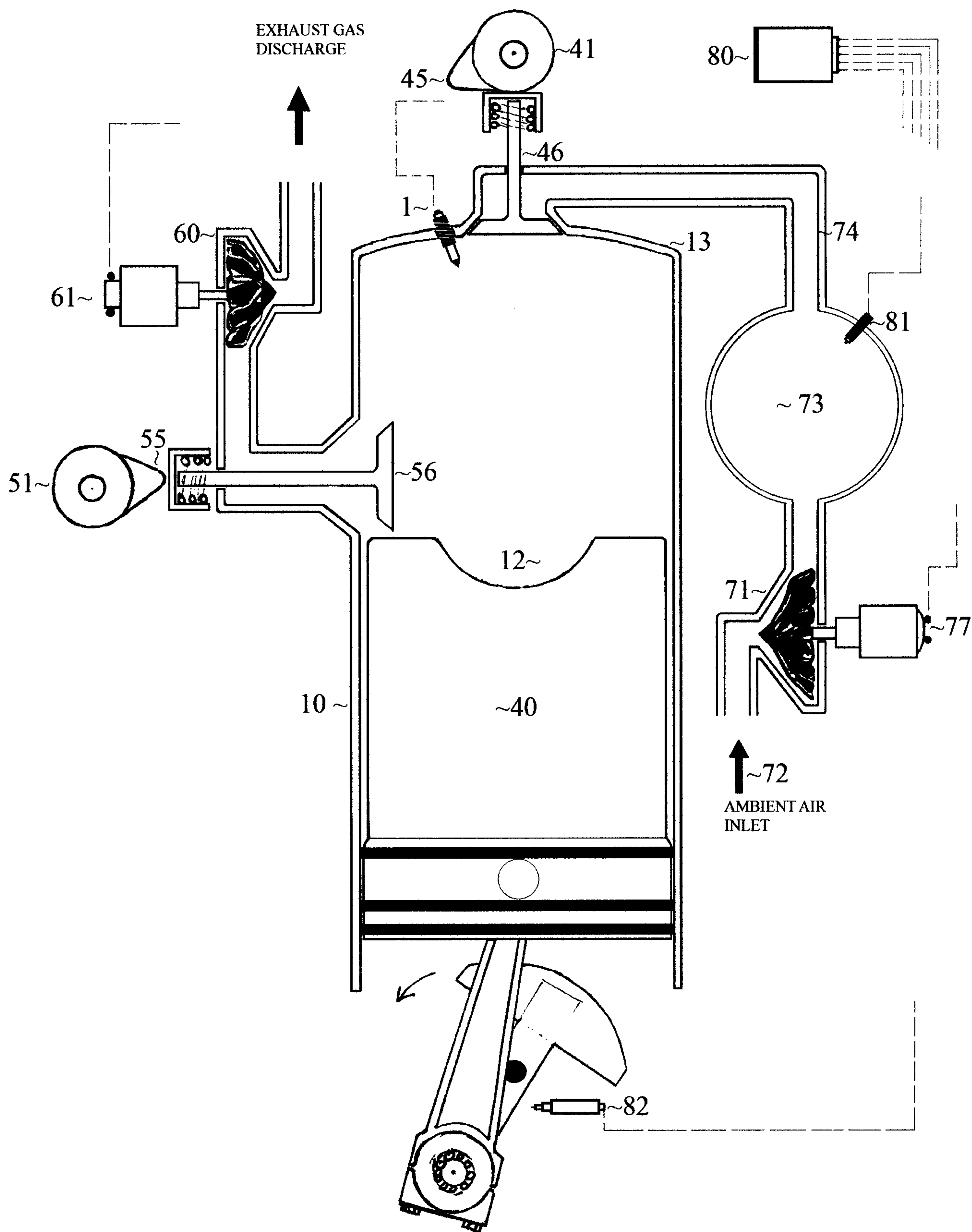


FIG. 2

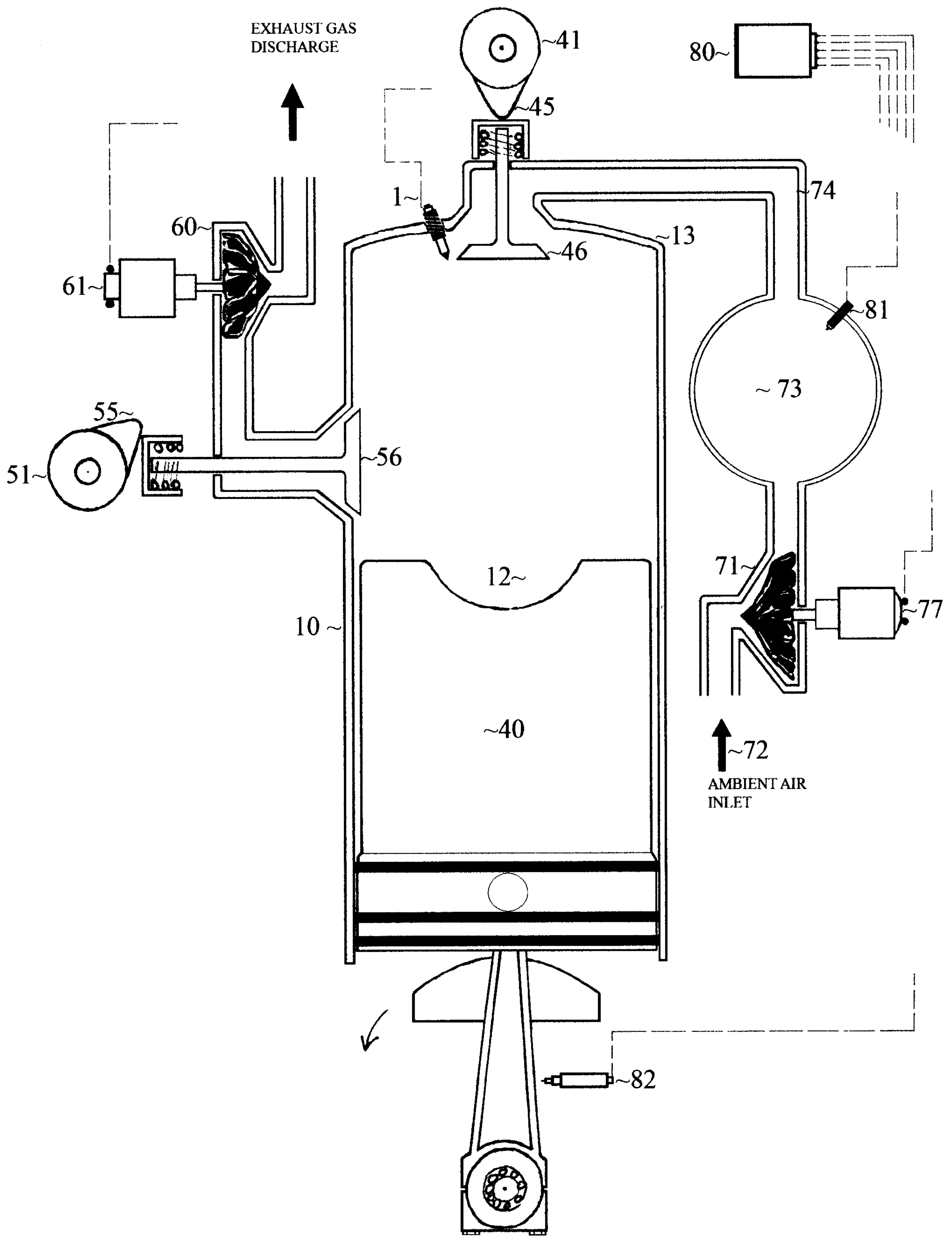


FIG. 3

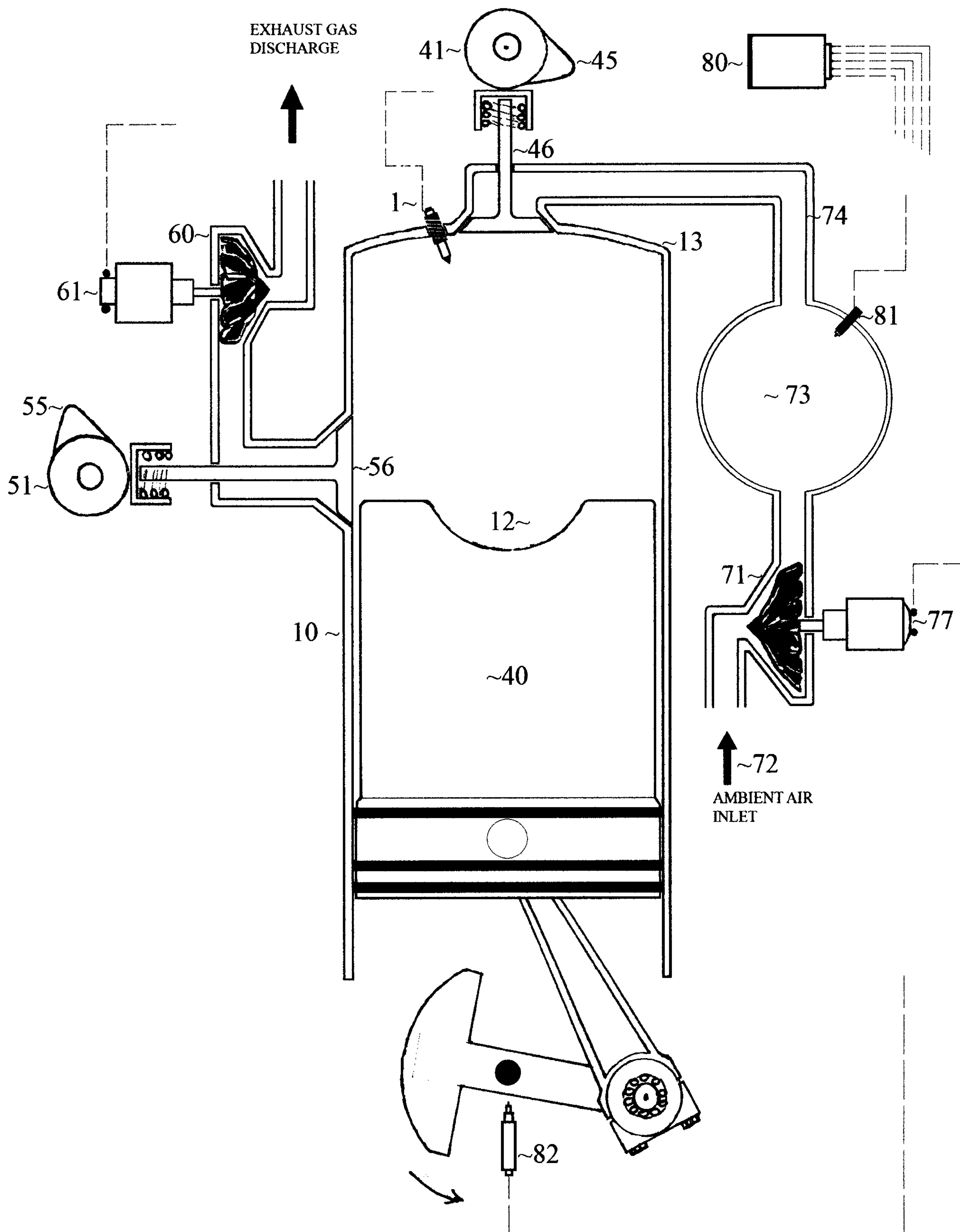


FIG. 4

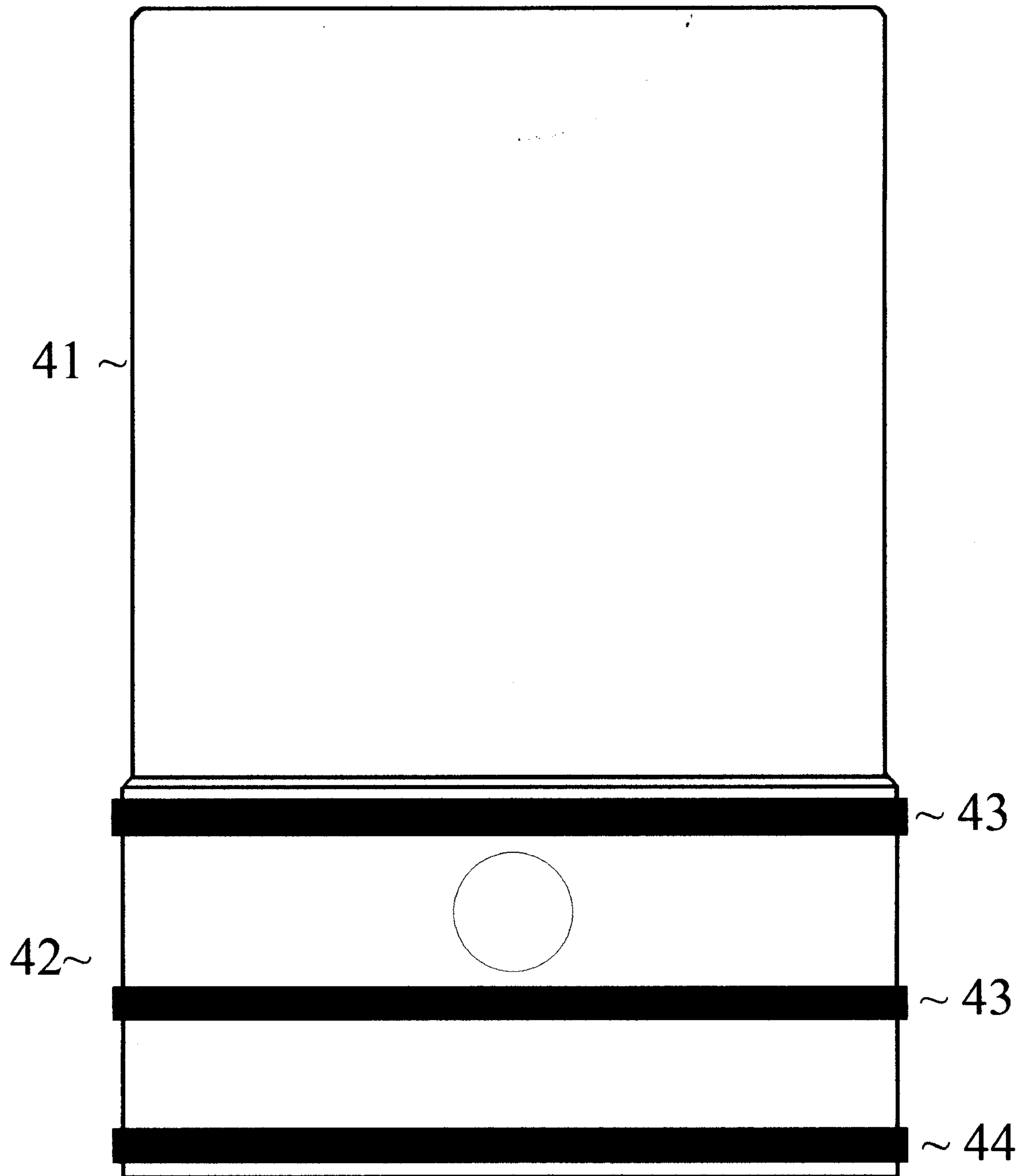


FIG. 5

