

Vibration Reduction Effect of a Heron Balancer on Engine Vibration Caused by Torque Fluctuation

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2-stroke engines were once used in automobiles, but in recent years 2-stroke engines for automobiles have disappeared. Though, the engines still are used for small operating machines. But, the workers feel bad vibration. The other, supercharged downsizing technology have been major for automobiles(4-stroke)engines. Reducing displacement with less cylinder numbers, 2 or 3 cylinders engines, oscillate larger vibration than 4 or 6 cylinders engines.

A Heron balancer is a type of reverse-rotating flywheel that is driven by the crankshaft of an internal combustion engine, and reduces vibration caused by the reaction moment of torque fluctuations. As a Heron balancer, a reverse rotation alternator with the same equivalent moment of inertia as the crankshaft system was attached to a small 2-stroke engine, and no installed Heron balancer(direct coupling)appatus with the same over all equivalent moment of inertia as the Heron balancer appatus was produced. Vibration at low rotation speed idel operation was measured by a dial gage and shooted videos. Fig.1 shows the direct coupling, watch carefully needles in red circles, vibration amplitude is about 2.5mm. Fig.2 shows thr Heron balancer, vibration amplitude is about 0.5mm. Fig.3 showed stop motions from the videos, the left is the direct coupling, the right is the Heron balancer. Direct coupling oscillates but Heron balancer is looked like freez. We have confirmed the effect of reducing the violent vibration caused by intermittent combustion during no-load operation, which is peculiar to 2-stroke engines, to the extent that it hardly occurs.

The Heron balancer is able to suppress vibrations caused by combustion cycle fluctuations and unequal-interval combustions. Furthermore, in addition to expanding the possibility of adopting a 2-3 cylinder engine, the possibility of adopting spark-ignition gasoline combustion for a 2-stroke opposed piston engine was shown.



Fig.1 Dial Gage of Direct Coupling

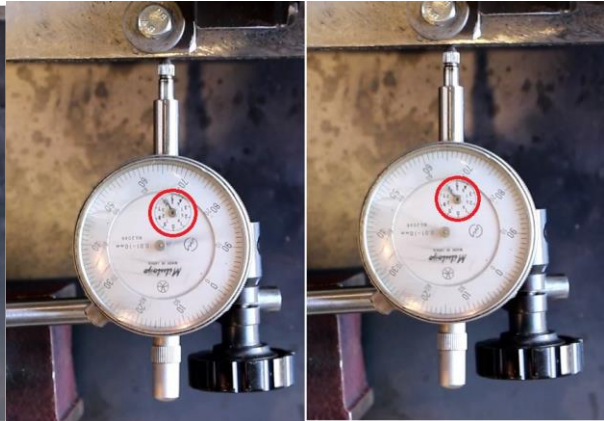


Fig.2 Dial Gage of Heron Balancer

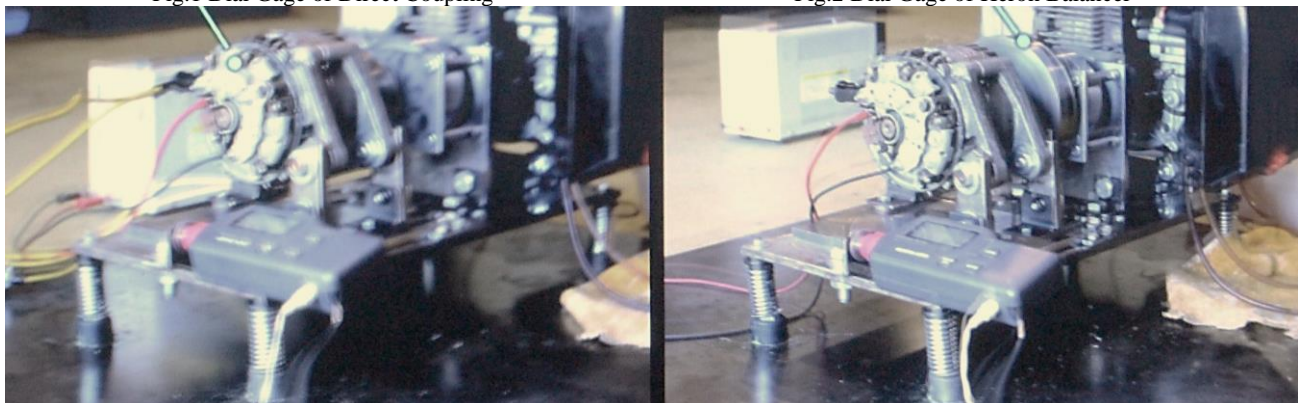


Fig.3 Vibration Comparing