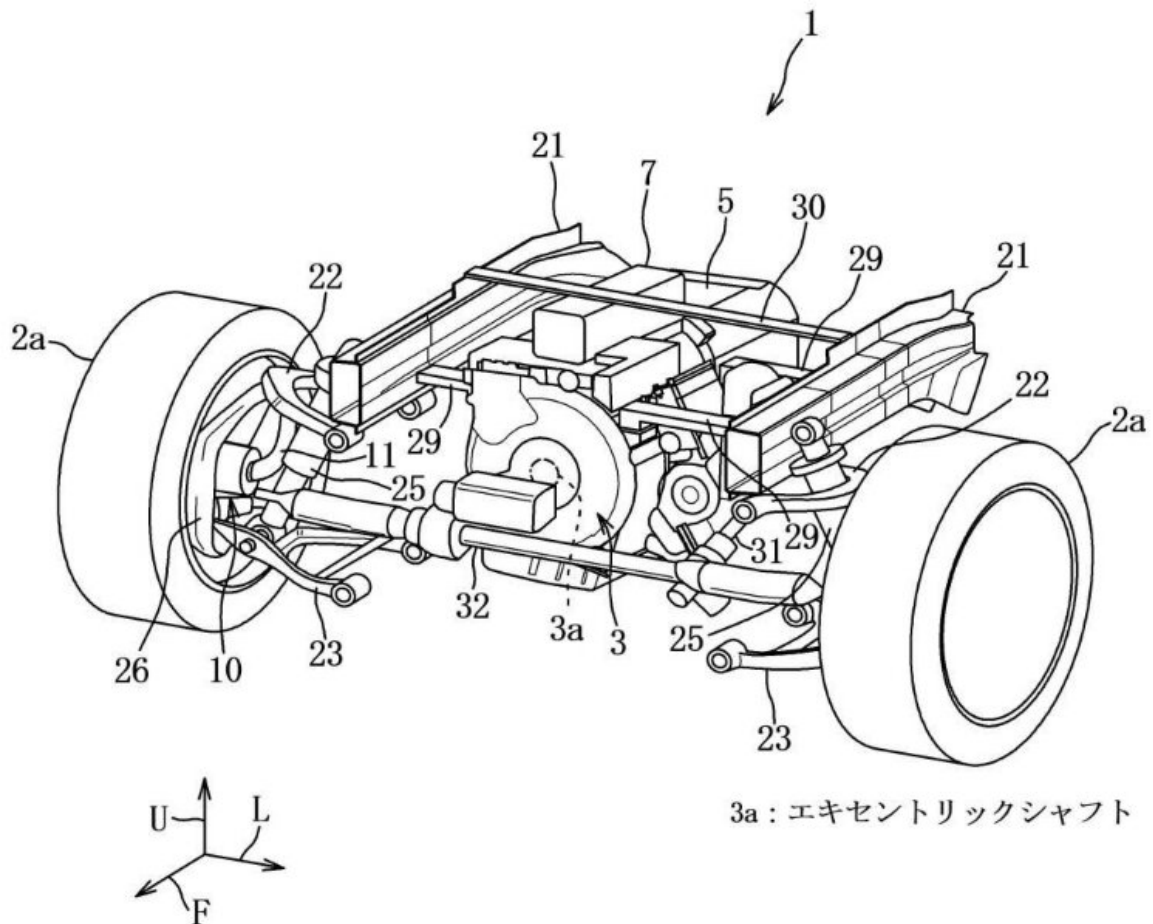


# Mazda files patent for hybrid rotary engine (Update)

April 21 2020, by Peter Grad



Rotary engines that once powered the gorgeous Mazda RX-7 two-seater,

rear-wheel drive coupe—a five-time winner of a coveted spot on Car and Driver's Ten Best autos list—were phased out by 2012. Their popularity in the Seventies and Eighties was boosted by their compact design and low weight, but they lost favor due to poor fuel efficiency in an increasingly environmentally conscious era.

But it appears Mazda is reinventing the wheel, so to speak. [Patent papers](#) uncovered in Japan show the auto manufacturer is planning a complex overhaul of the [engine](#) that could pave the way for a new era of low-weight, high-efficiency vehicles.

Mazda, in fact, has already revealed plans next year for the electric SUV MX-30 that will incorporate a [rotary engine](#) for the first time since 2011, when the RX-7's successor, RX-8, ended production due to falling sales.

But the new patent suggests a major leap in rotary design further down the road.

The new hybrid drive envisions a front-mounted [combustion engine](#) paired with an electric motor that controls the rear wheels. In addition, the front wheels would each carry their own electric motors running at a higher voltage than the rest of the vehicle.

The system utilizes a relatively [low-power](#) 3.5 kWh lithium-ion battery to handle the rear wheels, which is expected to be sufficient for typical acceleration in city driving. When more power is required, two inverters and an under-the-hood double-layer capacitor will come into play. The capacitors handle energy transfer more efficiently than the lithium-ion batteries. Those capacitors would be charged by the engine and also by [regenerative braking](#).

Regenerative braking converts kinetic energy into a usable power source than can be instantly utilized or stored either in the battery or capacitors.

Mazda did not release any details of a scheduled release. It is expected the new system would be used in a possible flagship sports car or other higher-priced model.

The Wankel rotary engine, named after the German inventor Felix Wankel, marked a revolutionary change in internal combustion when it was developed in the 1950s. Instead of the standard reciprocating piston engine with a fixed cylinder block and a rotating shaft, all parts of the Wankel engine rotated in a single direction. This rotary design advantage yielded smoother running, improved cooling and lower weight.

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But there were downsides:

As described by Jason Fenske of the automotive online community DriveTribe, the old rotary engine suffered four key disadvantages: "Rotary engines have a low thermal efficiency as a result of a long combustion chamber and unburnt fuel making it to the exhaust," he stated in an online post in 2018. "They also have problems with rotor sealing as a result of uneven temperatures in the combustion chamber since combustion only occurs in one portion of the engine. Oil consumption is also a problem, as oil is injected to add lubrication and help keep the rotor sealed. Finally, emissions are poor and fuel economy is terrible, and ultimately this is the cause of its death."

Still, rotary engines have found useful lives beyond automobiles. They can be found in planes, go-karts, jet skis, snowmobiles, chainsaws and auxiliary power units.

It remains to be seen if they will once again command the attention and admiration they garnered 40 years ago.

**More information:** [www.j-platpat.inpit.go.jp/c180...  
6741DF61C78F74/11/en](http://www.j-platpat.inpit.go.jp/c180...6741DF61C78F74/11/en)

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