might as well go ahead and improve the performance even further.

English engines generally run too hot. This is due to poor combustion efficiency, a result of the funny combustion chamber shapes of which the British were so fond. Britain now leads the world in employing efficient combustion chamber design, so you can see that progress *is* possible, even if not in your engine. The result of this poor efficiency is very high exhaust valve temperatures and the employment of special materials (as with Velocette) or frequent failure of the exhaust valve rim (Royal Enfield). Clearly, a reduction in valve temperature would be a good thing.

The temperature of the exhaust valve relates not only to the rate of heat input, but also to the rate of heat dissipation. If you can make the area around the valve seat cooler, the valve will cool better and thus run cooler. This doesn't improve engine efficiency; it just means the valve can survive the experience.

The area around the valve is heated by the exhaust gas giving up heat to the port. Consequently, if you can make the exhaust port as short as possible there will be less opportunity for heat input. If you can run the exhaust pipe right into the port and then isolate it thermally from the port, most of the heat in the gas will be given up to the pipe rather than the port. You don't really mind how hot the exhaust pipe gets, do you? It can be safely assumed that it won't melt and nothing else really matters.

Push-in pipe systems maximise contact between the pipe and the head, and of course the port has to be long enough to provide the fit. Once retention has been provided by the pair of bolts, none of this matters. You can see now why a loose ring is preferable; there's a heat barrier in the pipe/collar fit, another in the collar/retaining bolt fit and, in our modification, further barriers between the bolts, the pieces of round bar and the fins. By employing a copper/asbestos gasket in the pipe/head seal, a very effective heat barrier is provided against heat leaking back from the pipe into the head.

This can be further improved by removing the redundant part of the port – the part that originally provided the push-in fit. This will aid airflow over the fins immediately adjacent to the remainder of the exhaust port and prevent the head taking on heat by radiation from the pipe. If the fins are particularly deep in this area, I tend to leave a ring of metal at the outer edge of the fins to prevent "fin-ringing", a noise which MZ owners will tell you is quite appalling.

Changing the original appearance of the bike will matter little to Post-Industry Thorobred owners who are, of course, manufacturers and can do anything without reference to aesthetics or good engineering sense, (if recent Suzuki prototypes are any example). Less fortunate individuals might try explaining to outraged traditionalists that it's a special head made by a long-defunct foundry in the Scilly Isles.

## HEAT BARRIER