chapter

ELEVEN

Lost causes, oddballs, and unconventional engines.

There has never been any scarcity of ingenious people who have thought that they have found a better way to power airplanes than a conventional engine, and a fair number of them have raised enough money to bring their ideas to trial. Some of these ideas have been tried a time or two, found to be dead ends, and dropped. Others have kept recurring as new people have come along who have thought they saw where earlier experimenters went wrong.

Barrel Engines

Consider the barrel engine, which is a powerplant with its cylinders parallel to the shaft instead of at right angles to it. Its attraction lies in the fact that its frontal area is at a minimum, since its cylinders form a sort of closely packed bundle. There seem to have been three problems with barrel engines, two of them technical and one psychological. The most basic technical problem is to find a good way to have pistons drive a shaft that lies parallel to them. This has usually involved either a swash plate or a barrel cam (Fig. 11-1). The second problem has been cooling, especially if the engine is air-cooled; there is a lot of closely packed machinery, most of which generates heat, in a barrel engine. The psychological problem is one that has doomed not only most barrel engines but many other radical types as well. Their inventors seem to be incapable of using known low-risk technology for all but the essential new element; they throw in untried valve designs, peculiar bearings, strange cooling systems, and whatnot. They are unable to resist the temptation to try to be heroes. In addition, they make outrageous claims for their brainchildren.

The Alfaro, a swash-plate type built by the Indian Motorcycle Company, of

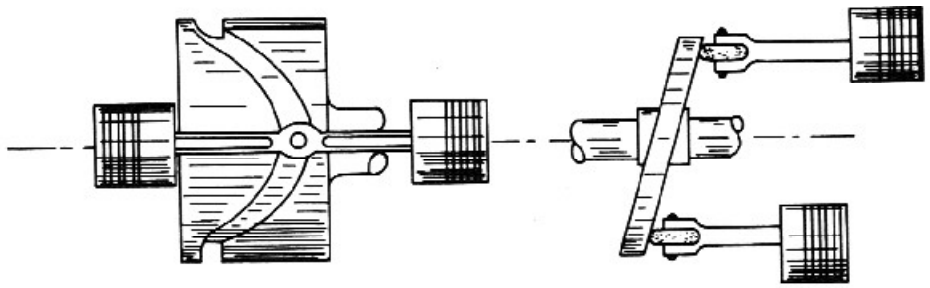

FIG. 11-1 The barrel cam and the swash plate.

Springfield, Massachusetts, in 1938,[1] exemplifies this. Not content to be a barrel engine, it was a two-stroke as well; it had funny valves involving rotating plates with holes in them; and it claimed the entirely incredible specific consumption of 0.435 lb (0.197 kg). The British government had traveled the same road earlier with the 1913 Statax, which, not content to be a barrel type, was at the same time a rotary. The Statax name stayed around long enough to be attached to an ambitious privately funded 1929 program involving sleeve-valve swash-plate engines, this time nonrotary. The U.S. Army Air Corps looked into so many barrel engines that, by the time it gave up on them in the early thirties, there was a stack of blueprints of unsuccessful engines that reached the rafters in a hangar at Wright Field.

None of this should be condemned as a waste of money. It should be remembered that for at least 60 years before Whittle, Ohain et al., people had been designing gas turbine engines that either melted or were hopelessly inefficient. Unless someone puts money into experiments, how will we ever know which wild-sounding ideas will turn out, with appropriate development work, to be world-beaters? And who better than governments, considering the military benefits when the occasional breakthrough occurs?

Some of them, of course, might better have been drowned at birth. For instance, the 50-hp American Macomber was a swash-plate rotary on which the tilt of the swash plate could be varied to change the stroke of the pistons. This is done today on oil pumps and hydraulic motors to vary the displacement, but why anyone would want to do it on an airplane engine is obscure at best.

At least four barrel engines found alternatives to swash plates and barrel cams. The British Redrup and Fury engines used a "Z" crankshaft, set at an angle to the engine's axis. By having the pistons twist as they reciprocated, with the aid of a wristlike joint in the connecting rods, rotary motion was obtained (Fig. 11-2). The Gadoux and the Cleveland, on the other hand, were actually assemblies of more or less conventional engines, grouped in barrel form and driving a central shaft through bevel gears. Optimistically anticipating military use, the Gadoux had a hollow shaft to allow a gun to be fired through it.

What is interesting about the long list of unsuccessful barrel engines is that some excellent pumps have been made on this principle. Have a look some time at a Frigidaire automobile air conditioning compressor. Nicely engineered and simple as it is, adding cooling, exhaust, ignition, and valves for four-stroke operation would turn it into a mechanical nightmare. There may be echoes of this in the Wankel engine; it is derived from what is said to have been an effective pump, but it does not seem to have been nearly as successful as a powerplant.

[1]Manufacture by Indian in 1938 was alone enough to guarantee failure. *De mortuis nil nisi bonum* and all that, but Indian was in those late days the farthest thing from a precision shop that could be found this side of the steam-locomotive factories.