torque at cruise to maintain the RPM on a dead engine! That is why it is virtually impossible to identify visually which of two or more reciprocating engines have failed in cruise flight. The windmilling propeller will turn the engine and its accessories—the generator, fuel pump, vacuum pump, air conditioner, everything. To the pilot there is no engine-related instrument indication of engine failure! It is nonetheless obvious because there is an incredible increase in drag on the side of the inoperative engine requiring the pilot to use heavy opposite rudder to keep the aircraft from yawing into the dead engine.

One student of mine suggested that there was an engine-related instrument that would indicate engine failure—the cylinder head temperature gauge (CHT). His theory was that the CHT would indicate that the failed engine was cooling down. Fundamentally that is correct, but there is a considerable time lag involved. If the pilot can't figure out which is the failed engine before it cools down enough to register on the CHT gauge, it is more likely they'll be determining the failed engine in the accident investigation afterwards!

Propeller Feathering

Engine failure in a single-engine aircraft always means a landing, but with two or more engines that is not necessarily the case. To make the airplane flyable on one engine, it is necessary to reduce drag to a minimum. The solution is to turn the edge of the windmilling propeller blade into the wind. The procedure, called *feathering*, sets the average blade angle to approximately 90 degrees, as depicted in Figure 9-5, which stops the propeller in flight. The pilot may feather a prop by pulling the appropriate lever all the way back to the low RPM setting, through the safety detent, and into the full aft, feathered position. Some aircraft, particularly large, older ones such as the DC-3, have a pushbutton control rather than prop-lever detent, but the result is the same. Feathering is totally independent of, and overrides, the constant-speed operation. In some aircraft, the propeller doesn't even have to be turning to be feathered.

The McCauley feathering system, common on many Cessna and Beech twins, uses counterweights and an internal spring that overrides oil pressure to feather the prop. That provides an inherent safety feature: If you lose oil pressure, the propeller automatically feathers. Not a bad idea, considering that an engine without oil will freeze up! A spring-loaded latch automatically engages during normal engine shutdown to prevent the prop from feathering.

When you feather a prop for practice, there are two ways to unfeather it in flight. Some aircraft, especially those used primarily for training, have unfeathering accumulators. This cylinder contains a diaphragm or piston that separates an air (or nitrogen) precharge from system oil. The pilot moves the prop lever out of feather to the full-forward position. When the unfeathering accumulator is activated, the high-pressure oil charge is moved to the propeller dome cylinder and forces the blades to a lower blade angle. Once the blade angle has been changed, the force of the relative wind begins to turn the prop with a dramatic increase in drag. At that point, fuel may be introduced and the magnetos turned on; the engine should start normally. Remember that the engine oil and cylinders will have cooled; give them time to warm up at a low power setting before returning to cruise power.