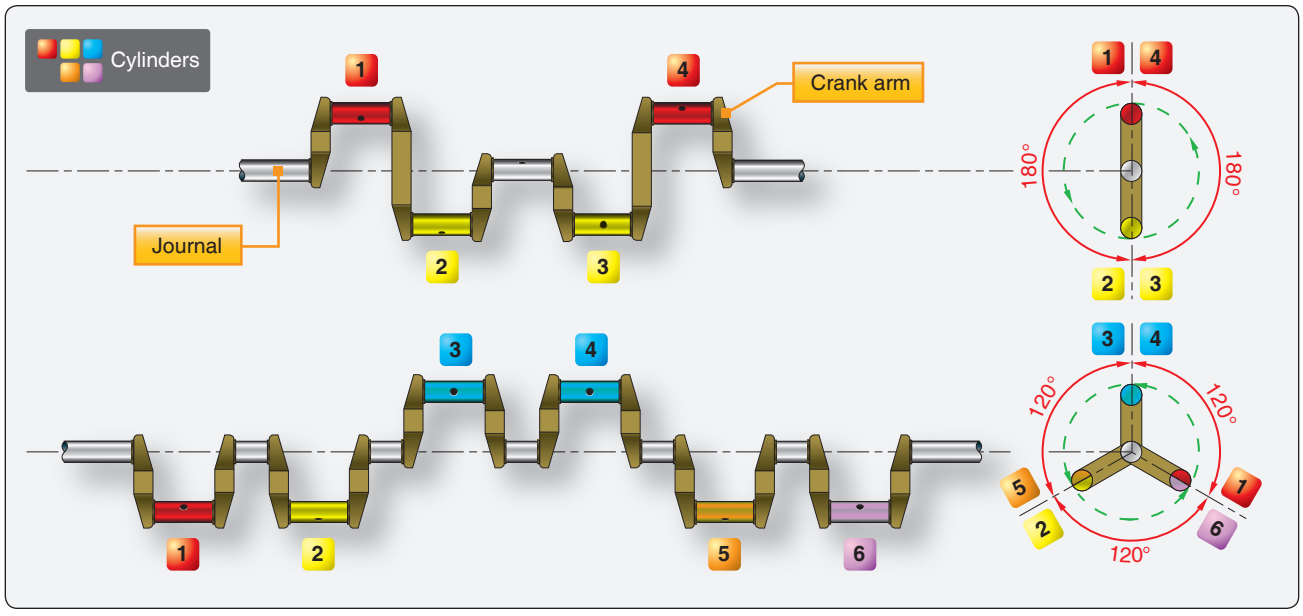

Figure 1-7. *Solid types of crankshafts.*

many throws it may have, each crankshaft has three main parts—a journal, crankpin, and crank cheek. Counterweights and dampers, although not a true part of a crankshaft, are usually attached to it to reduce engine vibration.

The journal is supported by, and rotates in, a main bearing. It serves as the center of rotation of the crankshaft. It is surface-hardened to reduce wear. The crankpin is the section to which the connecting rod is attached. It is off-center from the main journals and is often called the throw. Two crank cheeks and a crankpin make a throw. When a force is applied to the crankpin in any direction other than parallel or perpendicular to and through the center line of the crankshaft, it causes the crankshaft to rotate. The outer surface is hardened by nitriding to increase its resistance to wear and to provide the required bearing surface. The crankpin is usually hollow. This reduces the total weight of the crankshaft and provides a passage for the transfer of lubricating oil. On early engines, the hollow crankpin also served as a chamber for collecting sludge, carbon deposits, and other foreign material. Centrifugal force threw these substances to the outside of the chamber and kept them from reaching the connecting-rod bearing surface. Due to the use of ashless dispersant oils, newer engines no longer use sludge chambers. On some engines, a passage is drilled in the crank cheek to allow oil from the hollow crankshaft to be sprayed on the cylinder walls. The crank cheek connects the crankpin to the main journal. In some designs, the cheek extends beyond the journal and carries a counterweight to balance the crankshaft. The crank cheek must be of sturdy construction to obtain the required rigidity between the crankpin and the journal.

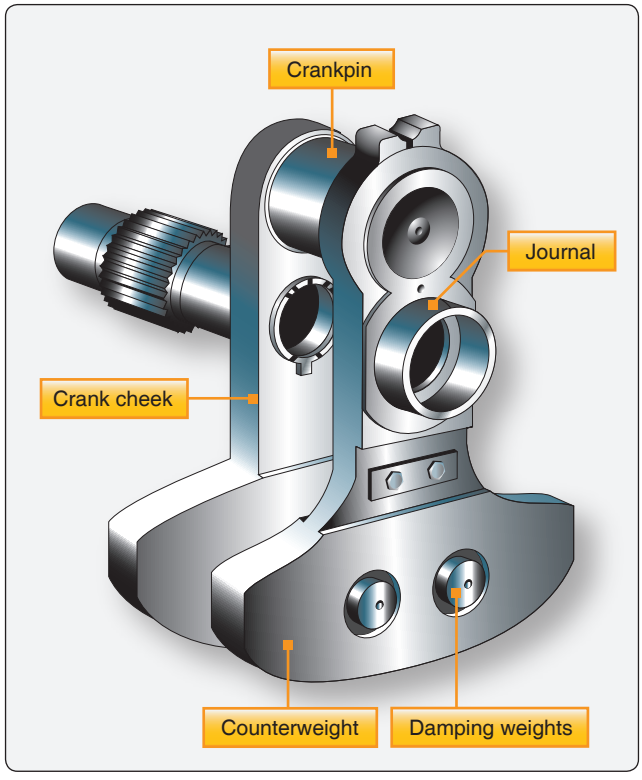

Figure 1-8. *A single-throw radial engine crankshaft.*

In all cases, the type of crankshaft and the number of crankpins must correspond with the cylinder arrangement of the engine. The position of the cranks on the crankshaft in relation to the other cranks of the same shaft is expressed in degrees.

The simplest crankshaft is the single-throw or 360° type. This type is used in a single-row radial engine. It can be