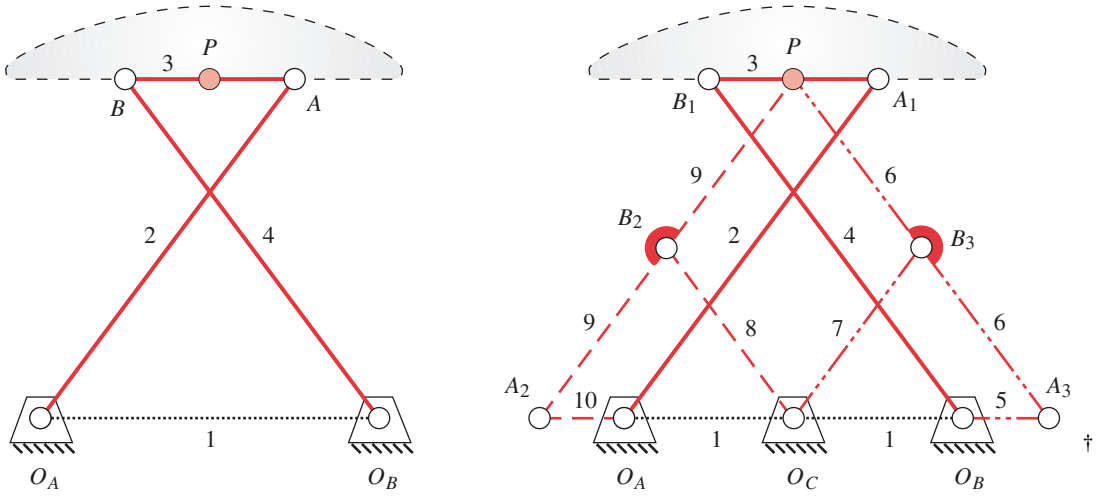

(*a*) A fourbar linkage and its coupler curve (*b*) Cognates of the fourbar linkage

FIGURE 3-26

Finding cognates of a fourbar linkage when its coupler point lies on the line of centers of the coupler

Parallel Motion*

It is quite common to want the output link of a mechanism to follow a particular path without any rotation of the link as it moves along the path. Once an appropriate path motion in the form of a coupler curve and its fourbar linkage have been found, a cognate of that linkage provides a convenient means to replicate the coupler path motion and provide curvilinear translation (i.e., no rotation) of a new output link that follows the coupler path. This is referred to as **parallel motion.** Its design is best described with an example, the result of which will be a Watt I sixbar linkage† that incorporates the original fourbar and parts of one of its cognates. The method shown is as described in Soni.[14]

* A video on constructing "Parallel Motion" linkages is provided on the book DVD.

†Another common method used to obtain parallel motion is to duplicate the same linkage (i.e., the identical cognate), connect them with a parallelogram loop, and remove two redundant links. This results in an eight-link mechanism. See Figure P3-7 on p. 160 for an example of such a mechanism. The method shown here using a different cognate results in a simpler linkage, but either approach will accomplish the desired goal.

EXAMPLE 3-11

Parallel Motion from a Fourbar Linkage Coupler Curve.

Problem: Design a sixbar linkage for parallel motion over a fourbar linkage coupler path.

Solution: (See Figure 3-27.)

1 Figure 3-27a shows the chosen Grashof crank-rocker fourbar linkage and its coupler curve. The first step is to create the Roberts diagram and find its cognates as shown in Figure 3-27b. The Roberts linkage can be found directly, without resort to the Cayley diagram, as described on p. 133. The fixed center O_C is found by drawing a triangle similar to the coupler triangle A_1B_1P with base O_AO_B.

2 One of a crank-rocker linkage's cognates will also be a crank-rocker (here cognate #3) and