6.77 For the frame and loading shown, determine the force acting on member ABC (a) at B, (b) at C.

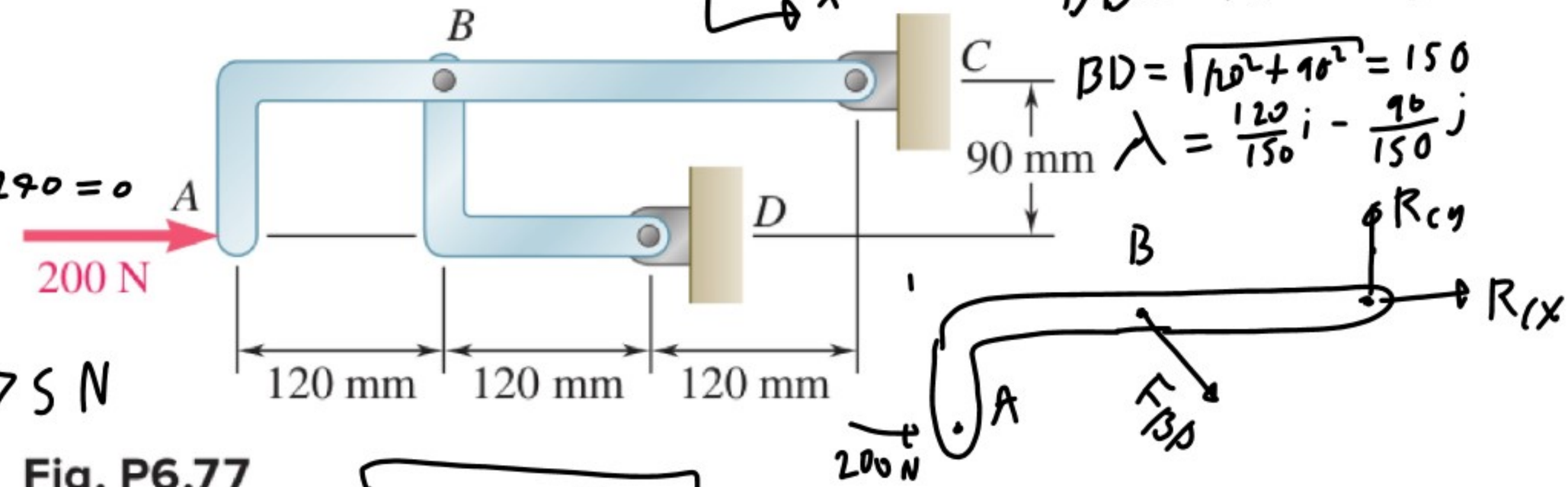


Fig. P6.77

$\Sigma M_C = 0$

$90 \cdot 200 + F_{BDy}\, 240 = 0$

$-90 \cdot 200 = F_{BDy}\, 240$

$\frac{-90 \cdot 200}{240} = F_{BDy} = -75\ N$

$\vec{BD} = 120i - 90j$

$BD = \sqrt{120^2 + 90^2} = 150$

$\lambda = \frac{120}{150} i - \frac{90}{150} j$

$F_{BD} = \frac{F_{BDy}}{\lambda_y} = \frac{-75}{-90/150} = \frac{150 \cdot 75}{90} = 125\ N = F_{BD}$

$$\sum M_B = 0$$

$$90 \cdot 200 + 240 R_{Cy} = 0$$

$$-90 \cdot 200 = 240 R_{Cy}$$

$$\frac{-90 \cdot 200}{240} = \boxed{R_{Cy} = -75}$$

$$\sum F_y = R_{Cy} - F_{BDy} = 0$$

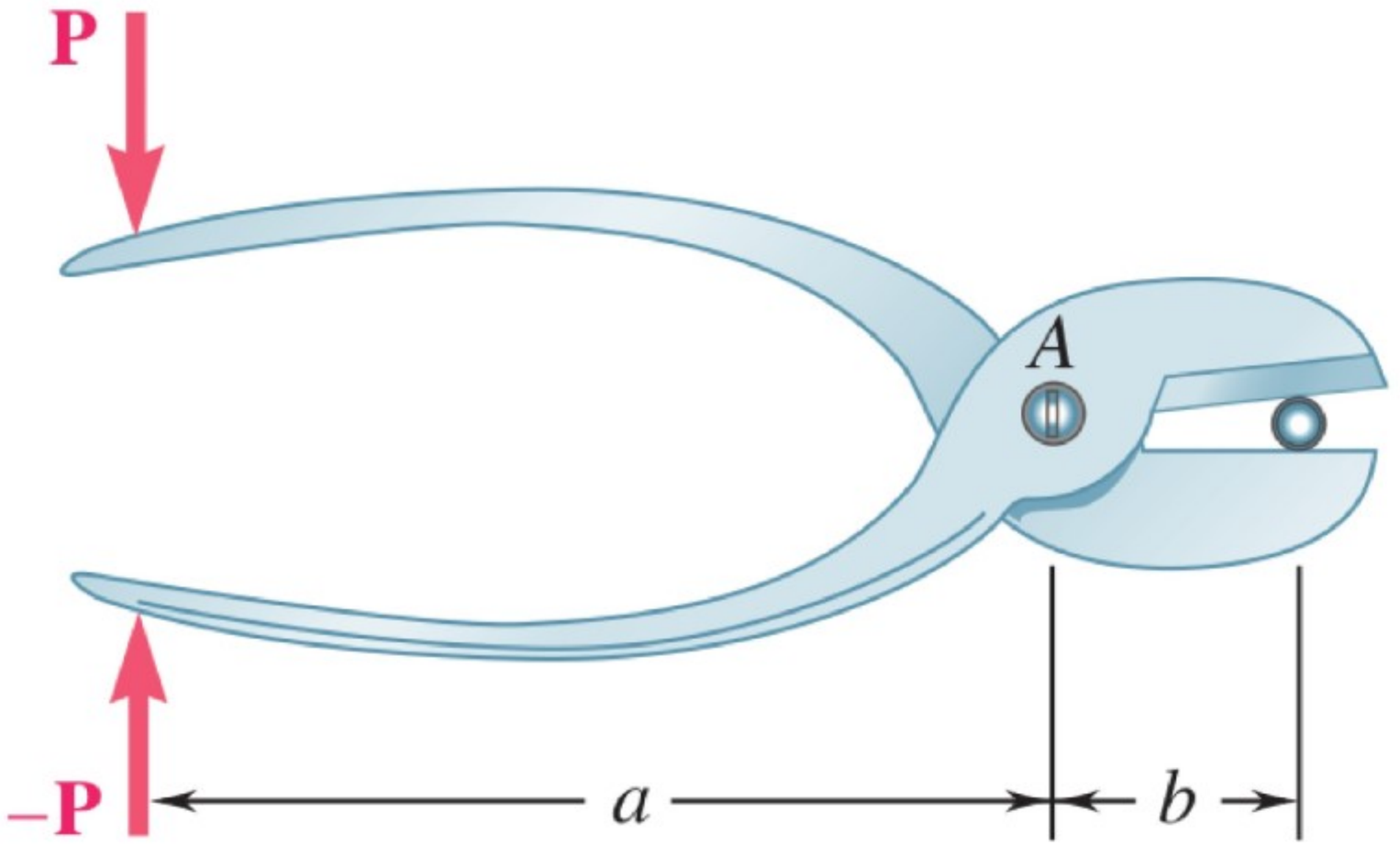
$$-75 - F_{BDy} = 0$$

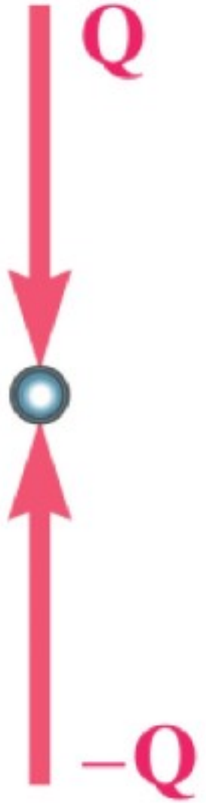
$$-75 = F_{BDy}$$

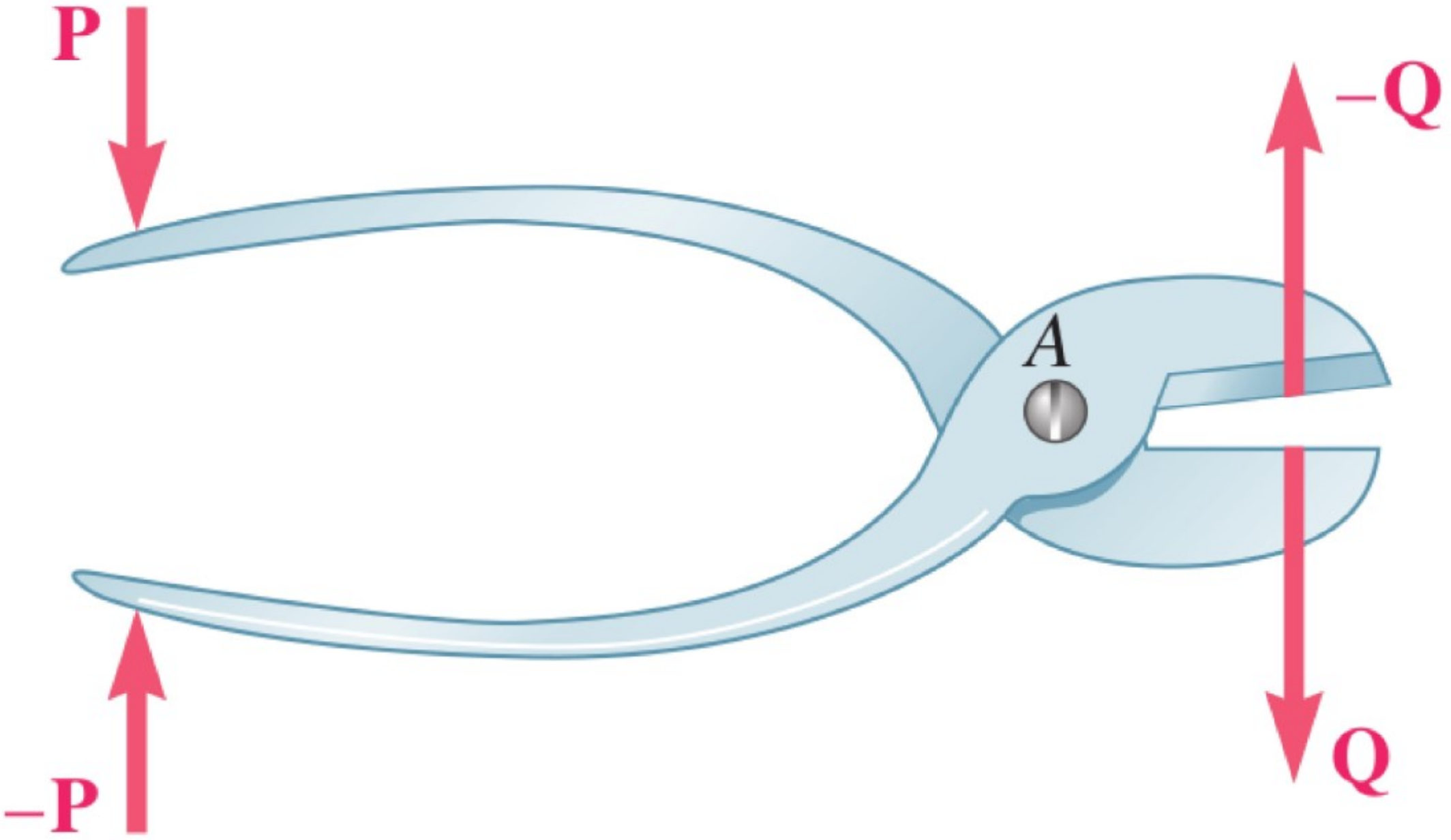
$$F_{BD} = \frac{F_{BDy}}{\lambda_y} = 125$$

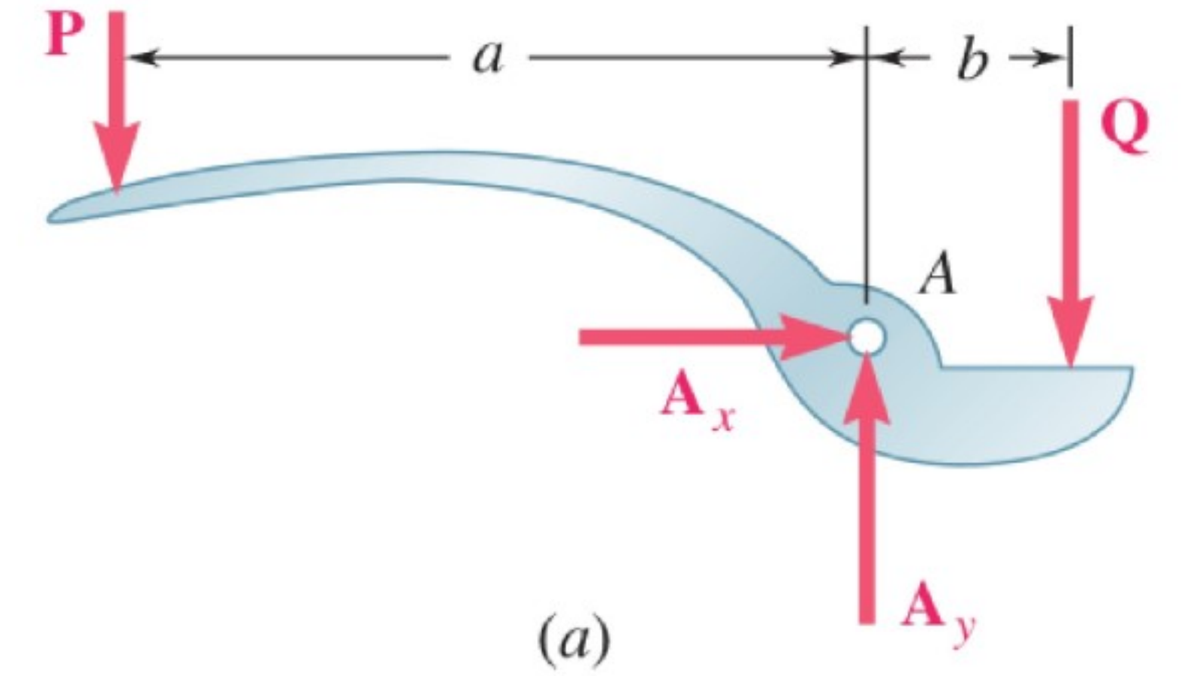
$$F_{BDx} = F_{BD} \lambda_x = 125 \ \frac{120}{150} = 100$$

Machines

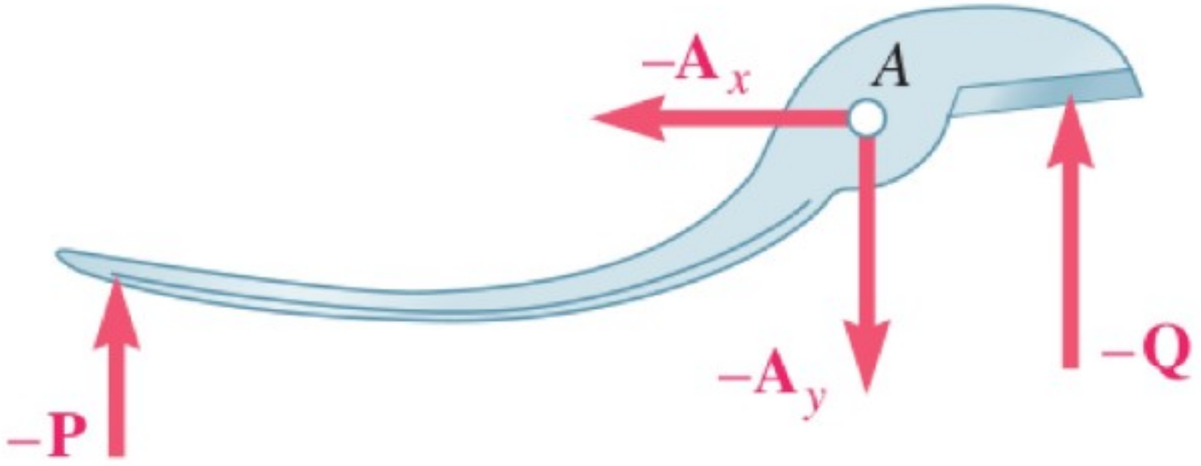





P
−Q
A
−P
Q



(a)



(b)

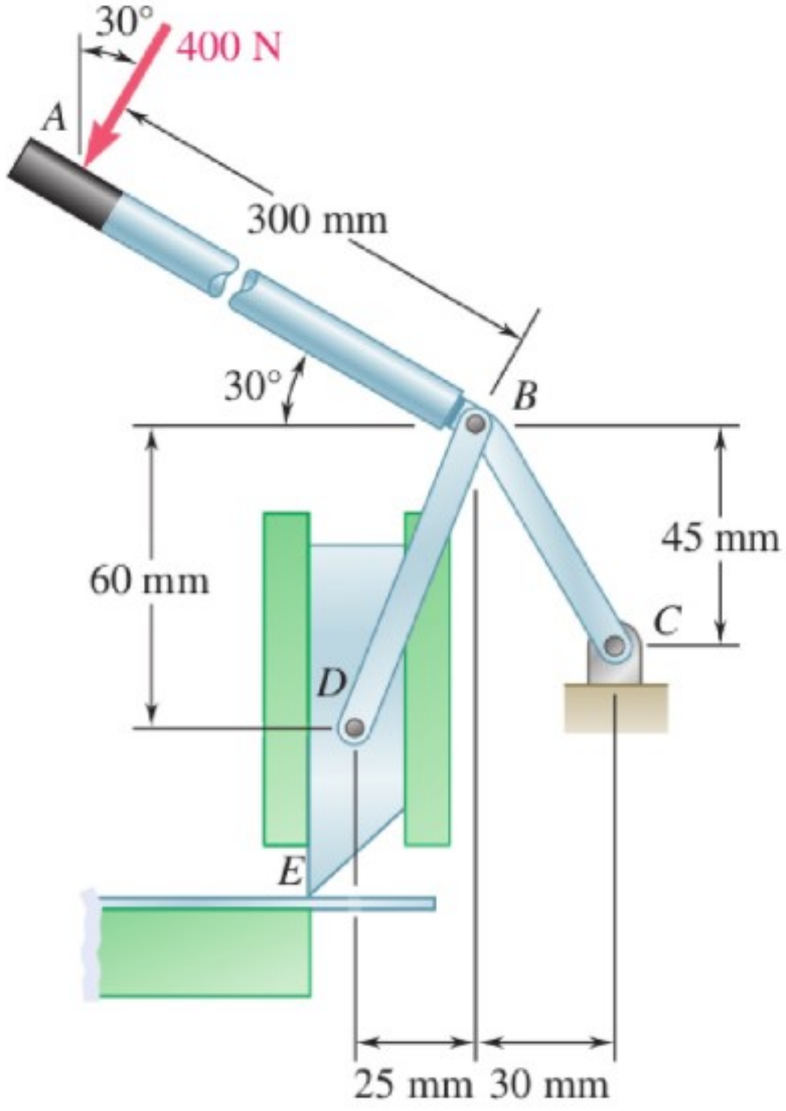
$$\Sigma M_A = 0$$

$$-bQ + aP = 0$$

$$aP = bQ$$

$$Q = \frac{a}{b} P$$

6.122 The shear shown is used to cut and trim electronic-circuit-board laminates. For the position shown, determine (*a*) the vertical component of the force exerted on the shearing blade at *D*, (*b*) the reaction at *C*.



6.123 A 100-lb force directed vertically downward is applied to the toggle vise at C. Knowing that link BD is 6 in. long and that $a = 4$ in., determine the horizontal force exerted on block E.