

sense each equal to F and let the distance between them be x ft., then must $Fx = T$.

Now, as this couple may act in any position on the link b let it be so placed that one of the forces passes through G and let the forces have the same direction as the acceleration of G . Further, let the force passing through G be the one which acts in opposite sense to the accelerating force F , this is shown on Fig. 139. Now the accelerating force F and one of the forces F composing the couple act through G and neutralize one another and thus the accelerating force and the couple producing the torque reduce to a single force F whose magnitude is $m_b \cdot G''O \cdot \omega^2$, whose direction and sense are the same as the acceleration of the centre of gravity G of b , and which acts at a distance x from G , (x being determined by the relation $T = Fx$), and on that side of G which makes the torque act in the same sense as the angular acceleration α .

The distance x of the force F from G may be found as follows:

Since $Q_T = b a_b = Q''A \cdot \omega^2$, Fig. 138, then $a_b = Q''A \cdot \frac{\omega^2}{b}$, because the line AQ'' represents Q_T on a scale $— \omega^2 : 1$.

Also $T = I_b a_b = m_b k_b^2 \cdot \frac{Q''A}{b} \cdot \omega^2$

and $F = m_b \cdot G''O \cdot \omega^2$

therefore $x = \frac{T}{F} = \frac{m_b k_b^2 \cdot \frac{Q''A}{b} \cdot \omega^2}{m_b \cdot G''O \cdot \omega^2} = \frac{k_b^2}{b} \cdot \frac{Q''A}{G''O}$ where $\frac{k_b^2}{b}$ is a con-

stant, so that $x = \text{const.} \times \frac{Q''A}{G''O}$ which ratio can readily be found

for any position of the mechanism. This gives the line of action of the single force F and, having found the position of the force, let M be its point of intersection with the axis of link b . Now find M' the image of M and move the force from M to its image M' , then the turning moment necessary on the link a to accelerate the link b is Fh , where h is the shortest distance from O to the direction of F , Fig. 139.

This completes the problem, giving the force acting on the link and also the turning moment at the link a necessary to produce this force. The same construction may be applied to each of the other