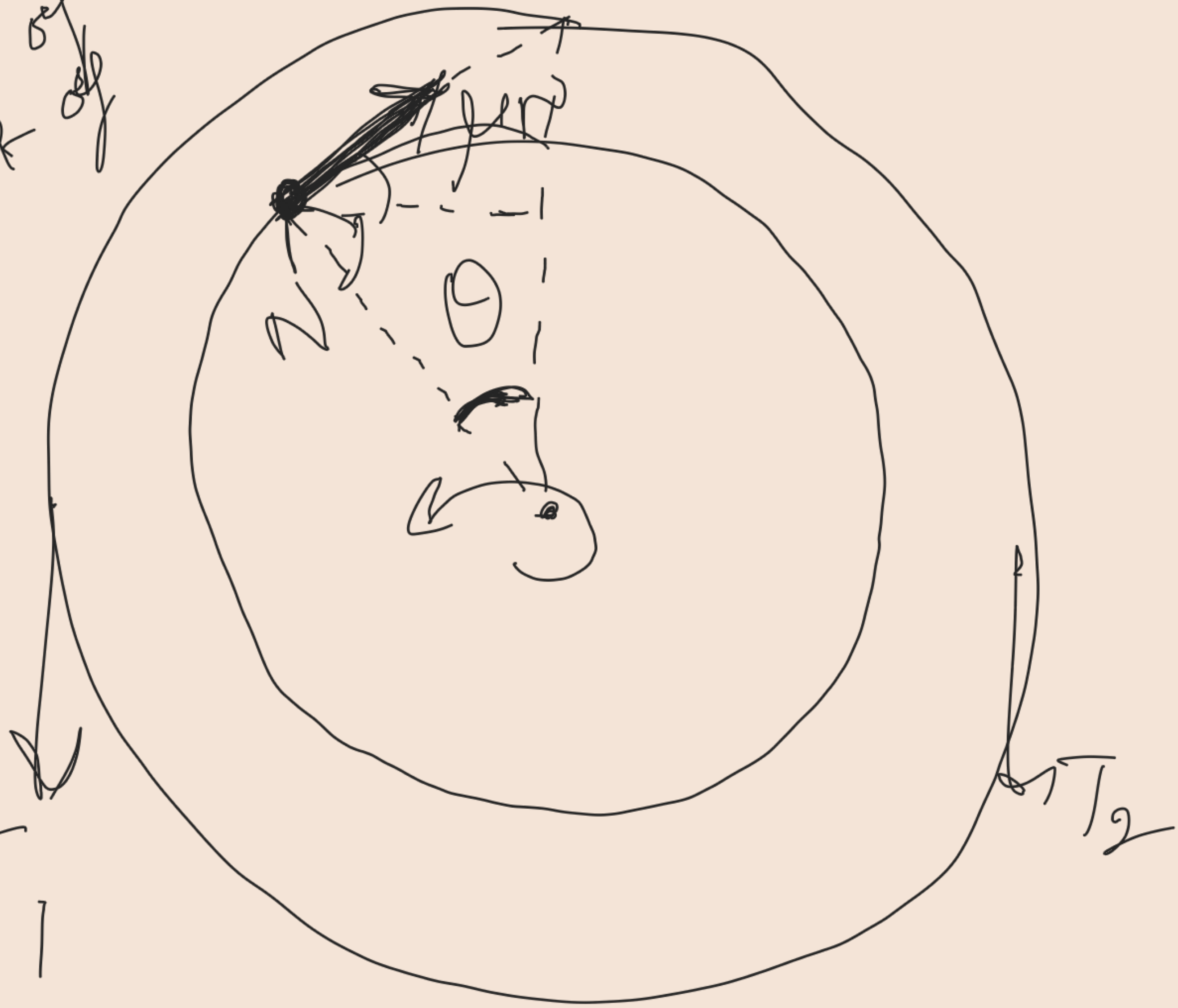
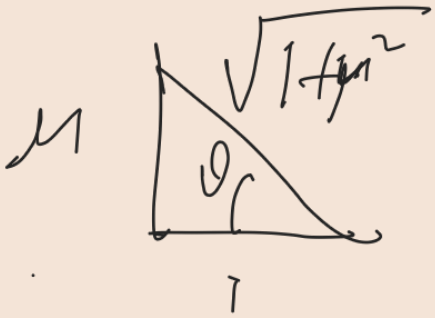
Point of contact of disc with cylinder



$$\cancel{N}\sin\theta = \mu\cancel{N}\cos\theta$$

$$\tan\theta = \mu$$



$$T_1 + T_2 = N\cos\theta + \mu N\sin\theta$$

$$= N\left[\frac{1}{\sqrt{1+\mu^2}} + \frac{\mu^2}{\sqrt{1+\mu^2}}\right] = N\sqrt{1+\mu^2}$$

$$(T_1 - T_2) R = \mu N (r)$$

$$(T_1 - T_2) = \frac{\mu r}{R} (N).$$

$$\frac{T_1 - T_2}{T_1 + T_2} = \frac{\mu r}{R} \frac{\cancel{N}}{\cancel{N}\sqrt{1+\mu^2}} = k = \gamma$$

$\downarrow$

Book

Symbol

$$Mg - T_1 = Ma$$

$$T_2 - mg = ma$$

$$(T_2 - T_1) = a(M+m) - g(M-m)$$

$$T_1 - T_2 = g(M-m) - a(M+m)$$

$$-T_1 - T_2 + Mg + mg = a(M-m)$$

$$T_1 + T_2 = g(M+m) - a(M-m)$$

$$\frac{g(M-m) - a(M+m)}{g(M+m) - a(M-m)} = k$$

$$g(M+m)k - ak(M-m)$$

$$= g(M-m) - a(M+m)$$

$$a\left[k(M-m)-(M+m)\right]$$

$$= g\left[k(M+m)-(M-m)\right]$$

$$a = \frac{g\left(\gamma(M+m)-(M-m)\right]}{\left[\gamma(M-m)-(M+m)\right]}$$

$$\Big($$

↓ Multiply both numerator & denominator by (−1) to get book answer

<u>format</u>. Book

also has done blunder by not mentioning that disc is <u>massless</u>.