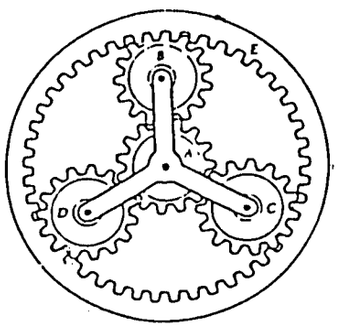
1. In the planetary gear system shown, the radius of the central gear A is a, the radius of each of the planetary gears is b, and the radius of the outer gear E is a + 2b. The angular velocity of gear A is ω_A clockwise and the outer gear is stationary. If the angular velocity of the spider BCD is to be $\omega_A/5$, determine (a) the required value of the ratio b/a, (b) the corresponding angular velocity of planetary gear B.



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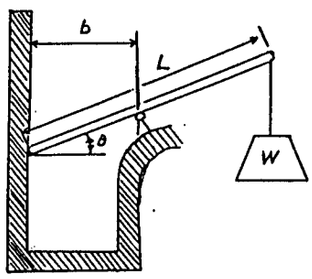
2. Use the principle of virtual work to find the angle θ for which the weight W can be supported by the rigid massless rod against the frictionless wall and the frictionless pivot. Note that in an admissible variation of configuration the rod must remain in contact with both the wall and pivot.



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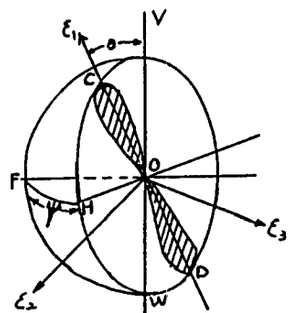
3. An airplane is flying and turning in a horizontal plane with a constant angular velocity $\dot{\psi}$, the axis of the propeller being horizontal. The propeller angular velocity $\dot{\theta}$ is also constant. Find the torque which must be provided by the engine as a function of θ. The principal moments of inertia of the propeller are $I_{\xi 1}$, $I_{\xi 2}$, $I_{\xi 3}$



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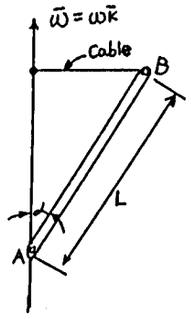
4. A slender bar AB of length L and Mass M is spun around a vertical axis with a constant velocity $\omega\bar{k}$. Determine all the forces acting on the bar. The support at A is a smooth pin. See Fig.



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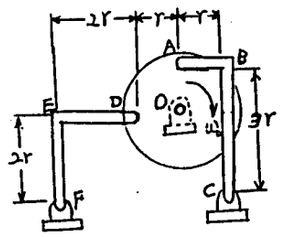
5. Two rods AB and BC, of mass m' per unit length, are connceted as shown to a disk which is made to rotate in a vertical plane at a constant angular velocity ω_0. For the position shown, determine the components of the forces exerted at A and B on rod AB.



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