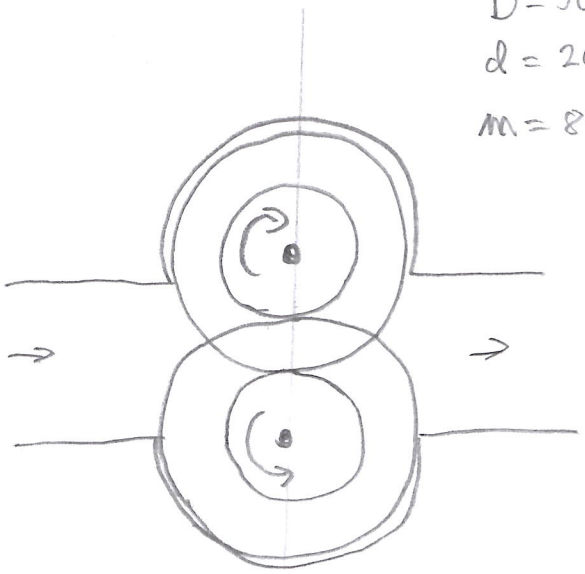
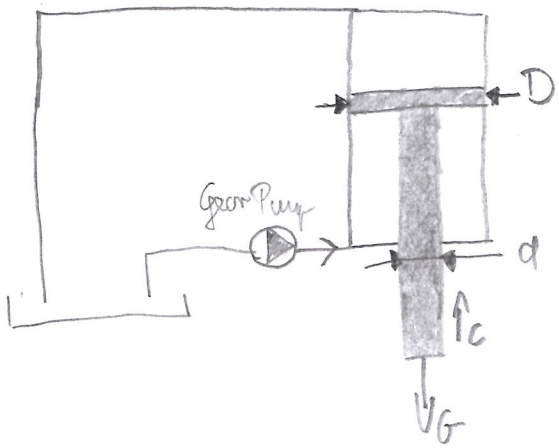
5.6.38.

$D = 50\ mm$ $\quad \eta_v = 92\%$ $\quad v = 12\ m/min$

$d = 20\ mm$ $\quad n_1 = 960\ 1/min$ $\quad n_2 = 1440\ 1/min$

$m = 800\ kg$ $\quad \eta = 74\%$





$Q_v = ?$, $V_g = ?$, $\Delta p = ?$, $P_m = ?$, $T_m = ?$ How much is P, T, Q if $n_2 = 1440\ 1/min$

$$A = \frac{(D^2 - d^2)}{4}\pi = 1{,}649 \cdot 10^{-3}\ m^2$$

$$Q_v = \frac{Q_\Delta}{\eta_v} = \frac{A \cdot v}{\eta_v} = \frac{1{,}649 \cdot 10^{-3} \cdot 12/60}{0{,}92} = 3{,}585 \cdot 10^{-4}\ m^3/s = 21{,}5\ dm^3/min$$

$$V_g = \frac{Q_g}{n} = \frac{21{,}5}{960} = 0{,}0224\ dm^3 = 22{,}4\ cm^3$$

$$\Delta p = \frac{mg}{A} = \frac{800 \cdot 9{,}81}{0{,}001649} = 47{,}6\ bar$$

$$P_{ein,p} = P_{ü,m} = \frac{Q_g \cdot \eta_v \cdot \Delta p}{\eta} = \frac{3{,}585 \cdot 10^{-4}\ m^3/s \cdot 0{,}92 \cdot 4759248\ Pa}{0{,}74} =$$

$$= 2{,}12\ kW$$

$$T_{Welle} = \frac{P}{\omega} = \frac{2122\ W}{100{,}53\ rad/s} = 21{,}1\ Nm$$