

$$\tau = \frac{V_{ann}}{V_z} = \frac{L \cdot B \cdot H}{V_z}$$

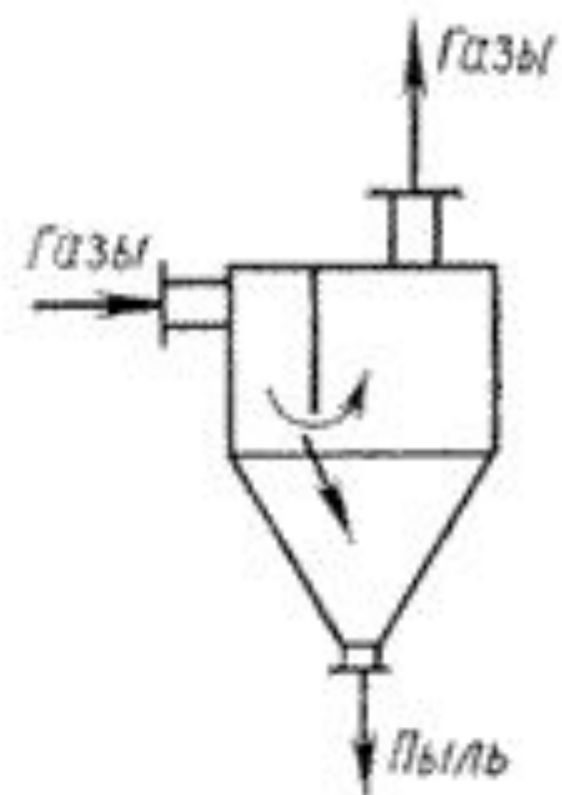
$$h = V_{cp} \tau$$

$$\frac{\pi d_r^3}{6} \rho_u g = 3\pi \mu_z d_u V_{cp}$$

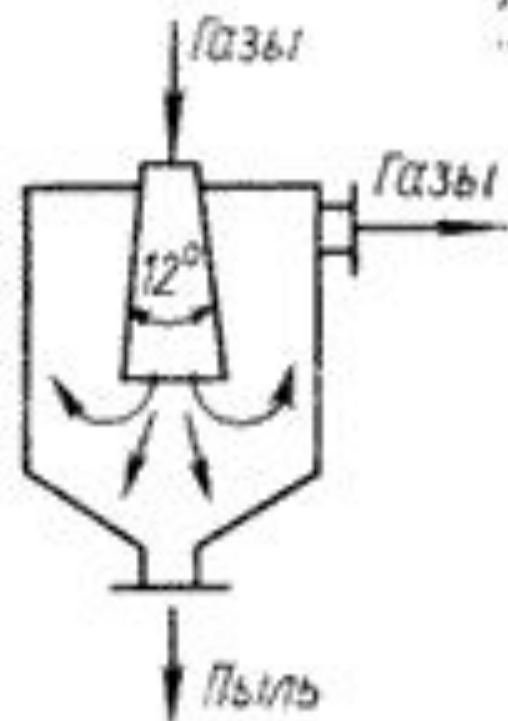
$$V_{cp} = \frac{d_u^2 \rho_u g}{18\mu}$$

$$\tau = \frac{L \cdot B \cdot H}{V_z} = \frac{L \cdot B \cdot V_{cp} \tau}{V_z} = \frac{L \cdot B \cdot d_u^2 \rho_u g \tau}{V_z \cdot 18\mu}$$

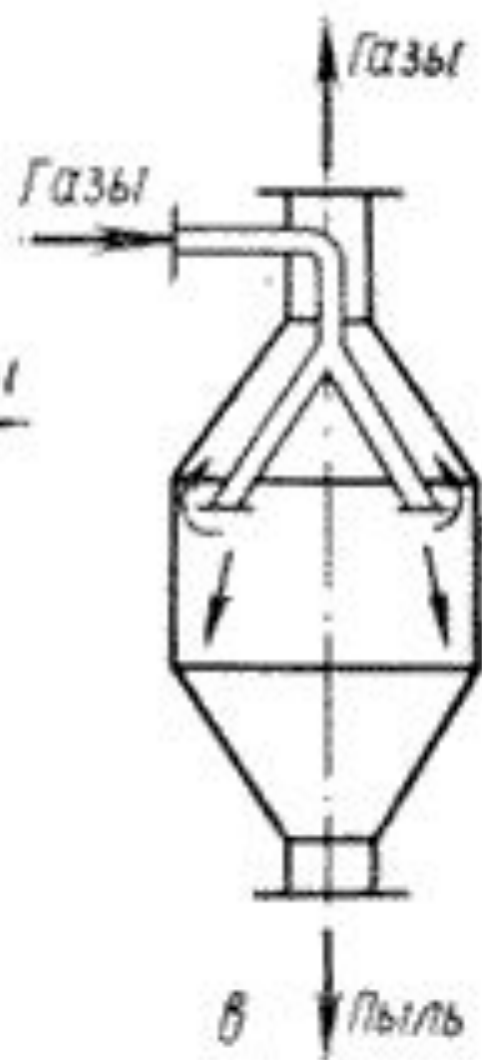
$$d_{u \min} = \sqrt{\frac{18V_z \mu}{\rho_u g L \cdot B}}$$



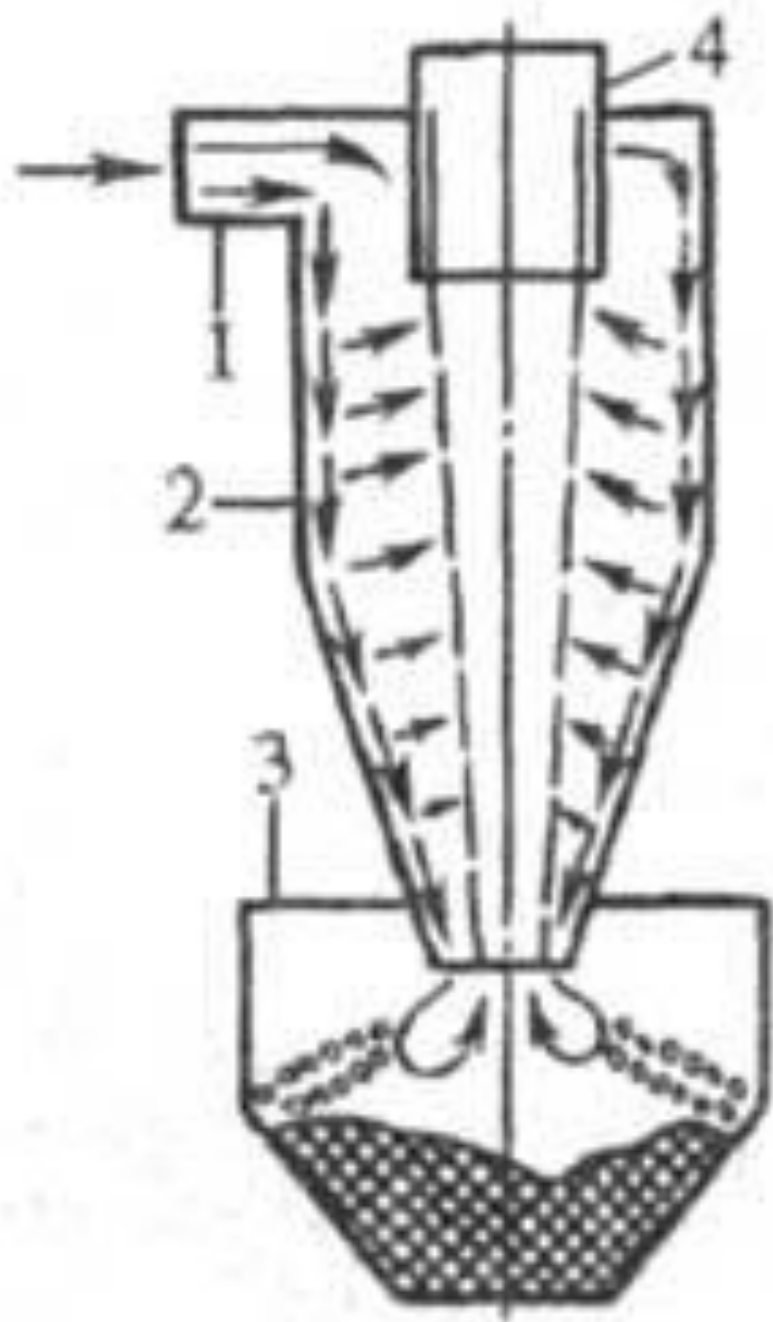
а

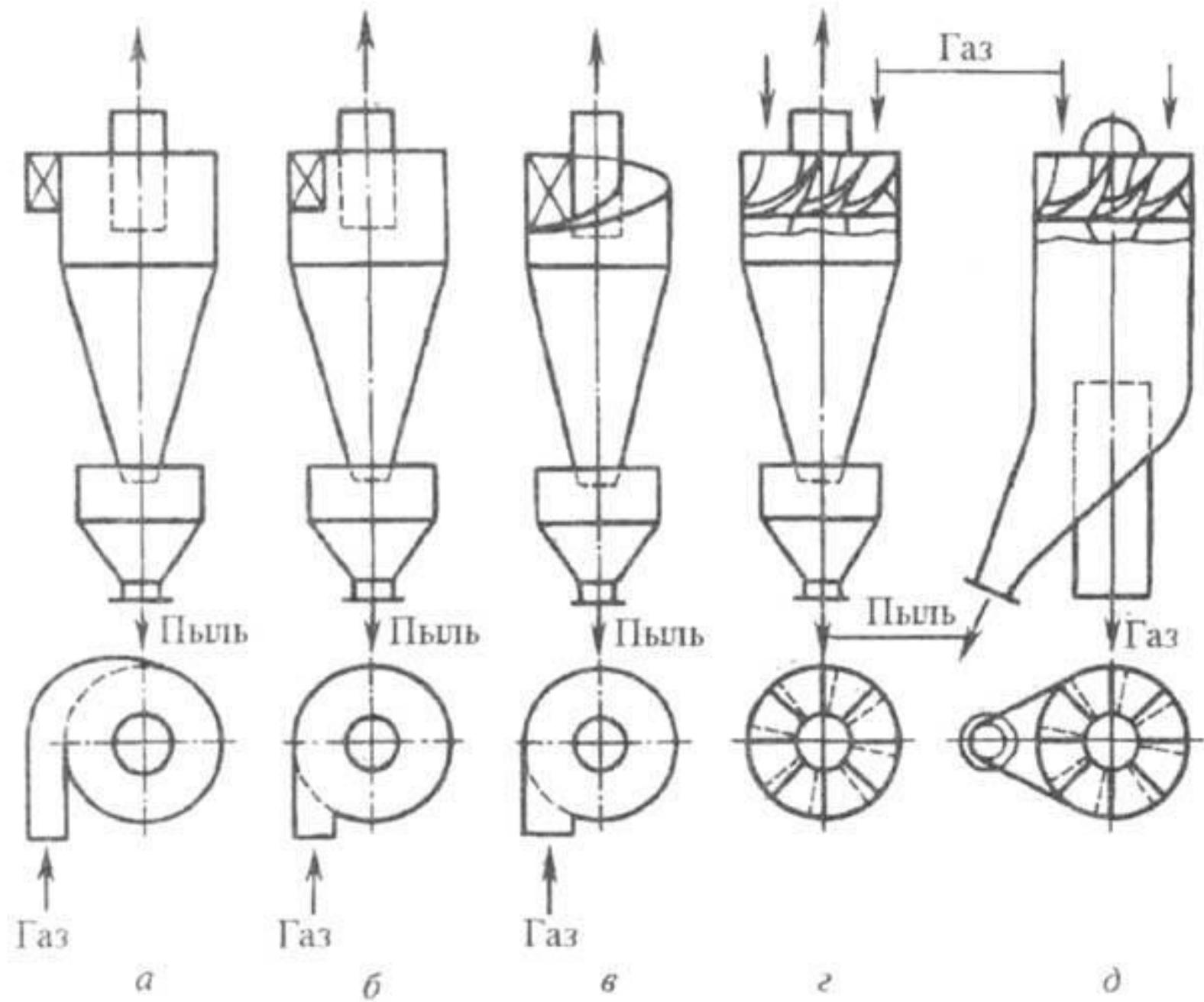


б



в





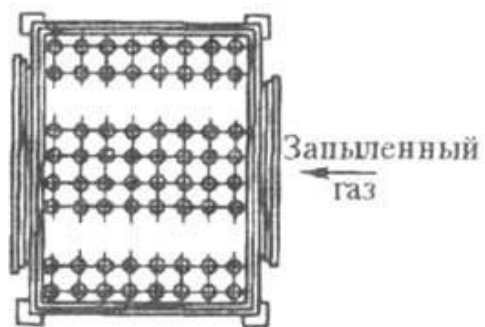
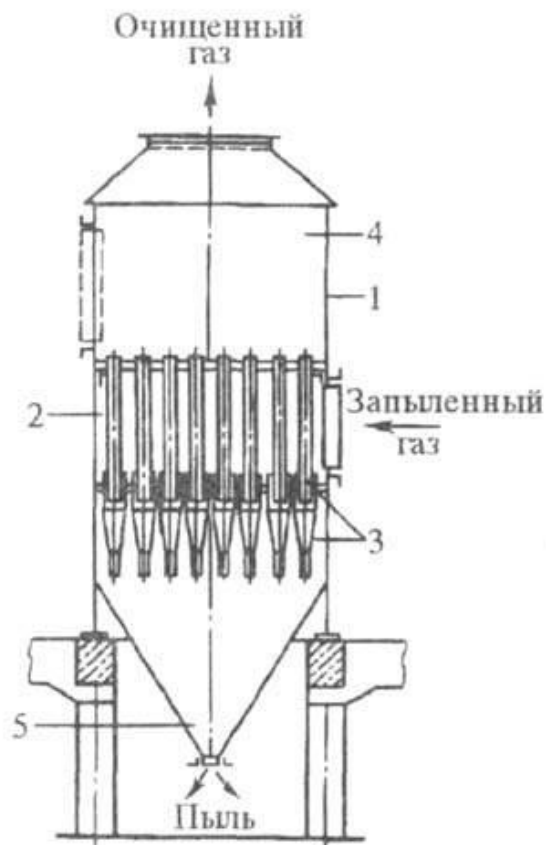
$$\Delta p = 1/2 \xi v^2 \rho_{\Gamma} \quad (1)$$

$$\eta = f(\text{Stk}, \xi), \quad (2)$$

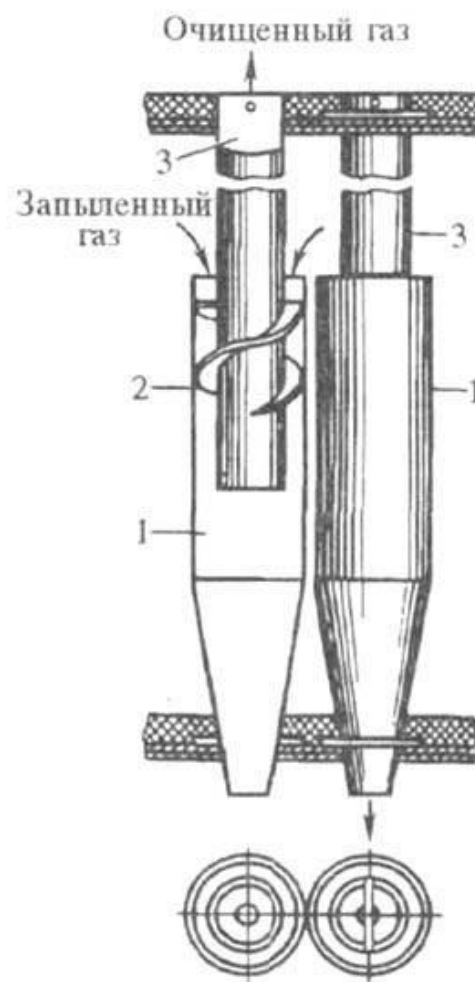
$$\text{Stk} = d_{\text{q}}^2 \rho_{\text{q}} v / 18 \mu D$$

$$d_{50} = 14,5 \cdot 10^{-5} \xi^{-0,51} \sqrt{D \mu / v \rho_{\text{q}}} \quad (3)$$

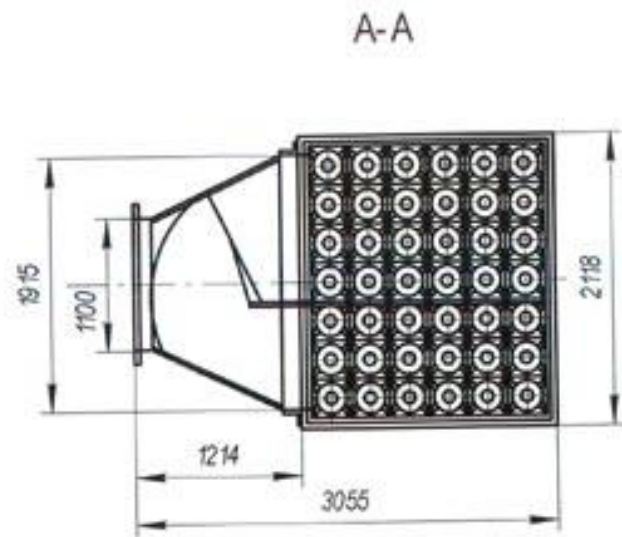
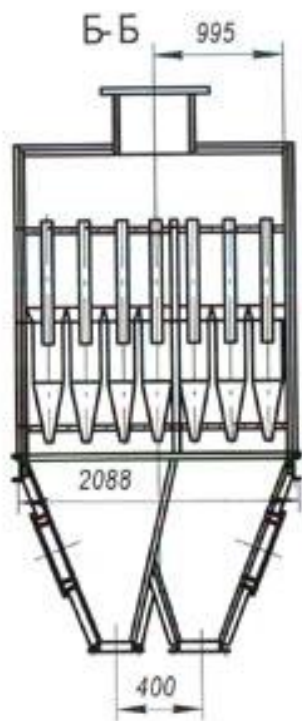
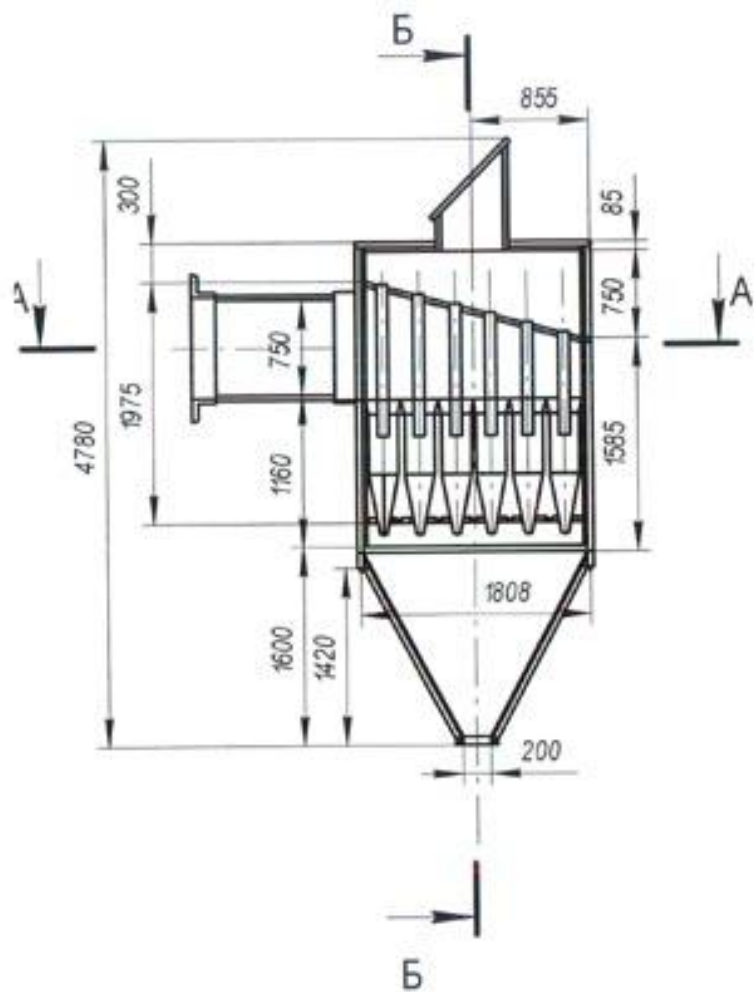
$$x = [\lg (d_{\text{M}} / d_{50})] / \sqrt{\lg^2 \sigma_{\text{q}} + \lg^2 \sigma_{\eta}},$$



a



b







$$d_{кр} = \frac{3}{2} \sqrt{\frac{D_{\text{ц}}^2 \mu}{2H(\rho_{\text{ц}} - \rho_{\text{г}})V_{\text{г}}'}} \left[1 - \left(\frac{D_{mp}}{D_{\text{ц}}} \right)^4 \right]$$

$$d_{кр} = 3 \sqrt{\frac{V_{\text{ц}} \mu D_{\text{ц}} (D_{\text{ц}} + b)}{\rho_{\text{ц}} (V_{\text{г}}')^2 V_{\text{г}}}} \sqrt{1 - \frac{D_{\text{ц}} - b}{2D_{\text{ц}}}}$$

$$V_{\text{ц}} = \frac{\pi}{4} \left[\left(\frac{H - H_{\text{ц}}}{D_{\text{ц}} - D_{\text{в}}} \right) \left(\frac{D_{\text{ц}}^3 - D_{\text{в}}^3}{3} \right) + D_{\text{ц}}^2 H_{\text{ц}} - D_{mp}^2 h_{mp} \right]$$

