

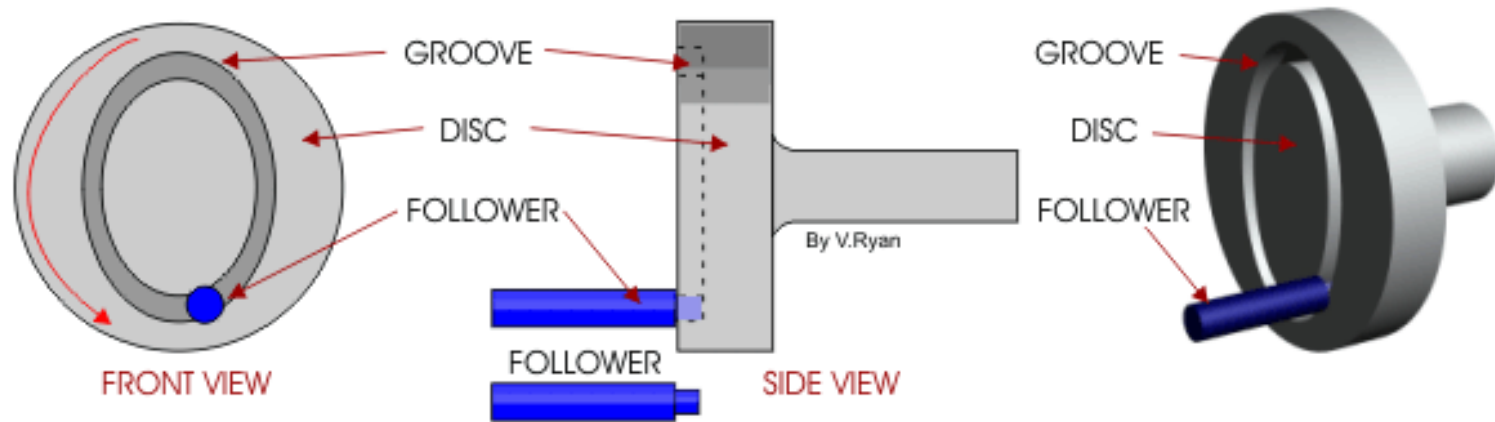
Гърбични механизми

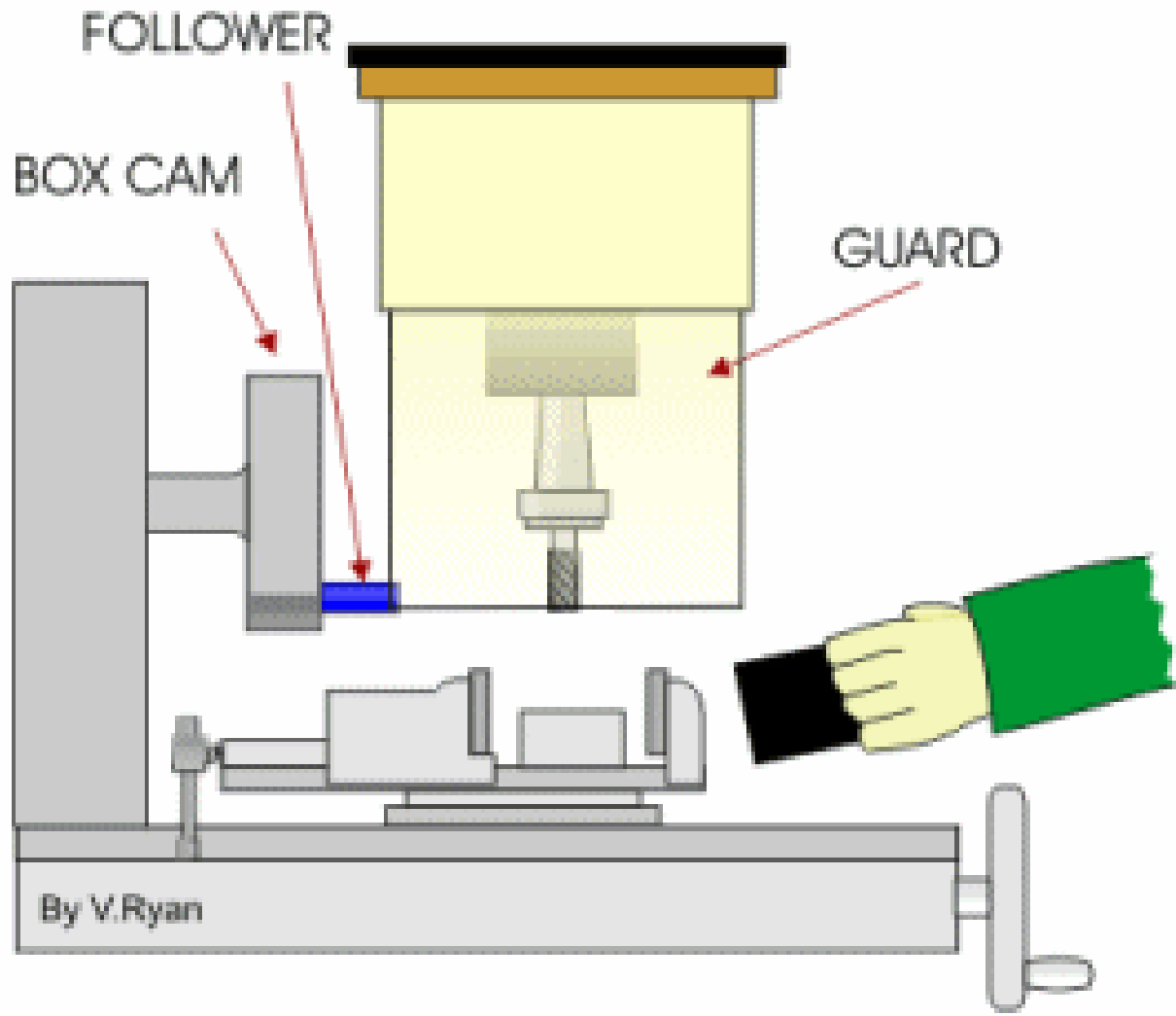
1. Приложение на гърбичните механизми.
2. Видове гърбични механизми и тяхните особености.
3. Съображения при конструирането на гърбици.

Илюстрации за приложението и принципа на работа на гърбиците

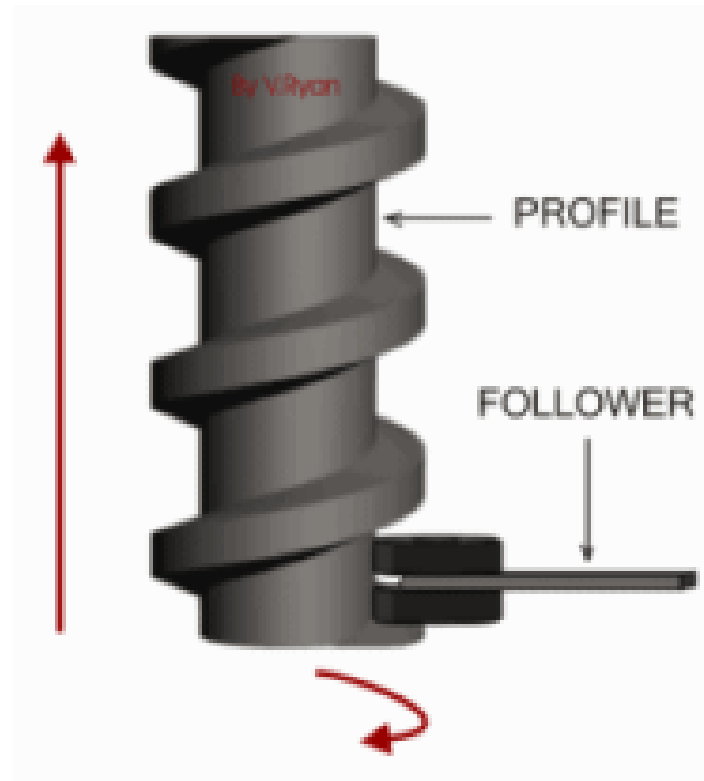
- Флаш анимации
- 1 Филм
- 2 Филм
- 3 Филм

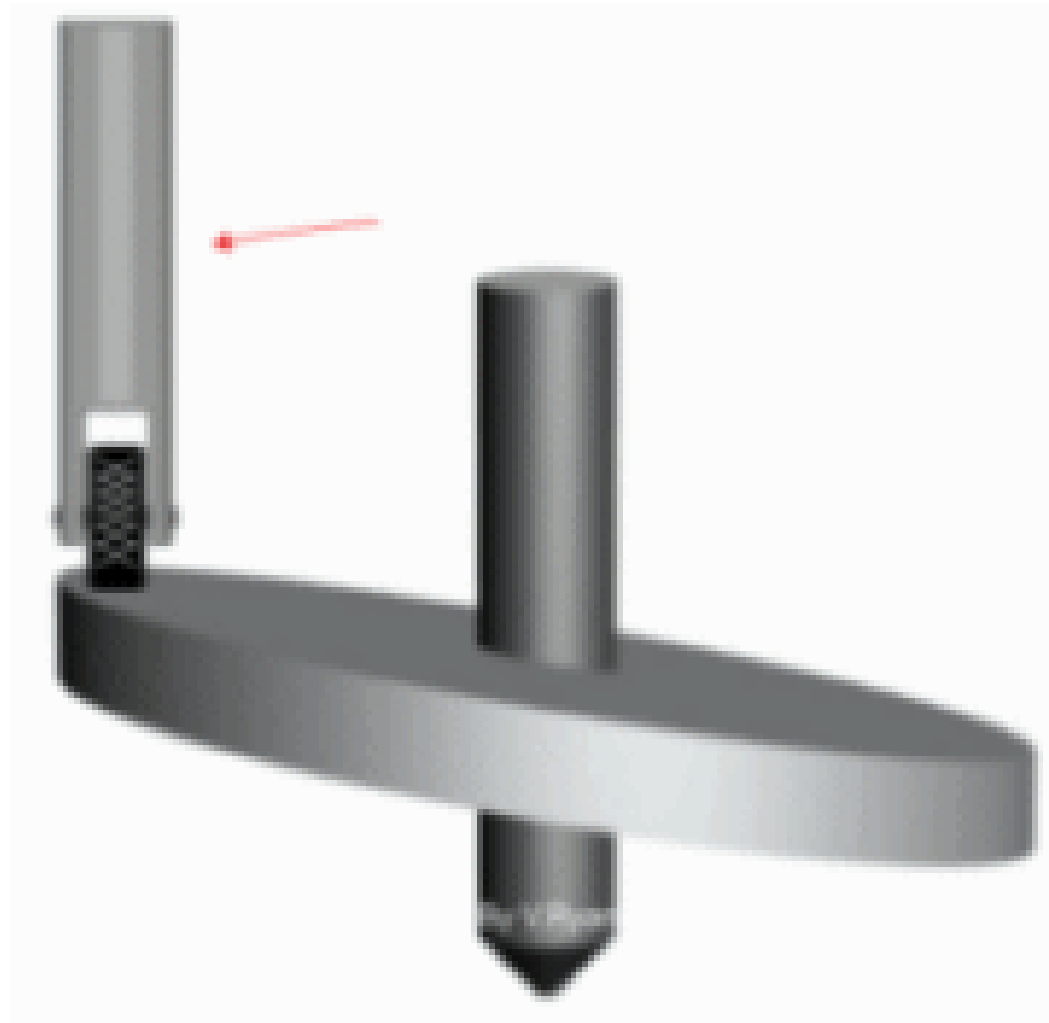
Дискова гърбица



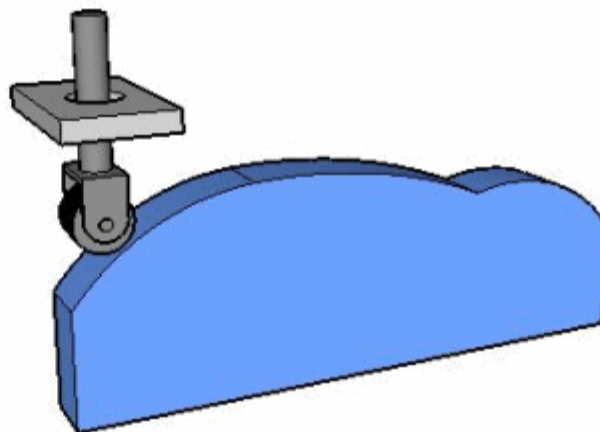


Цилиндричен механизъм



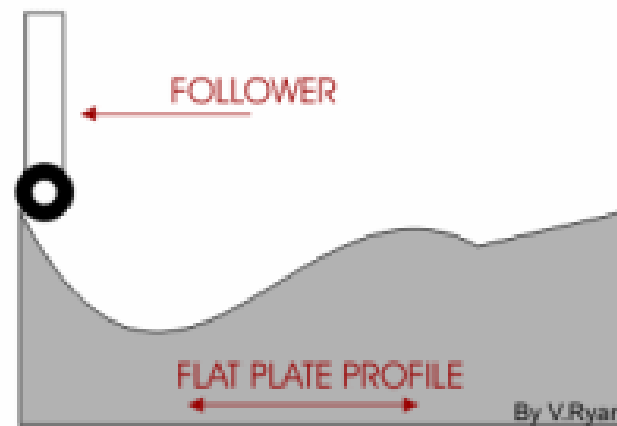


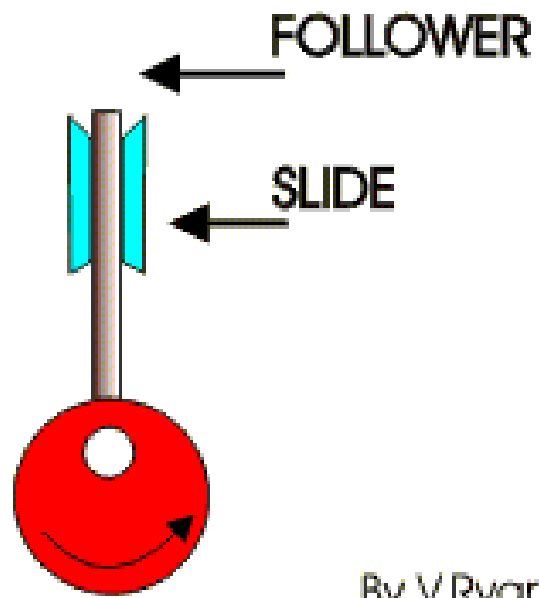
Плоска гърбица



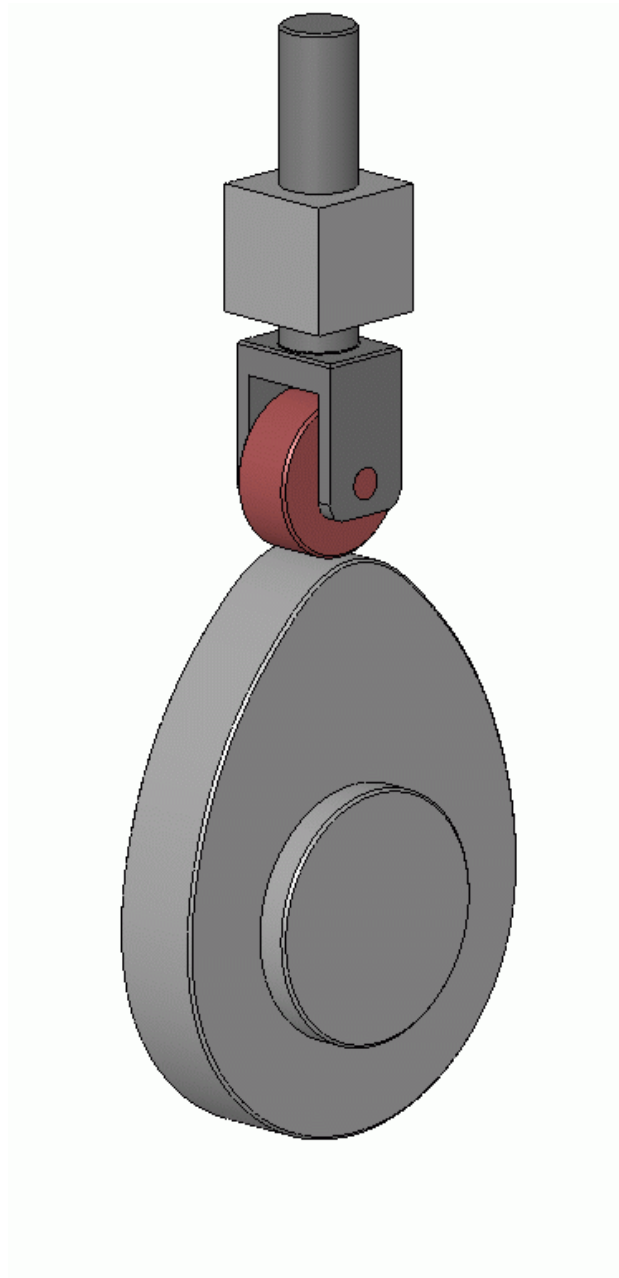
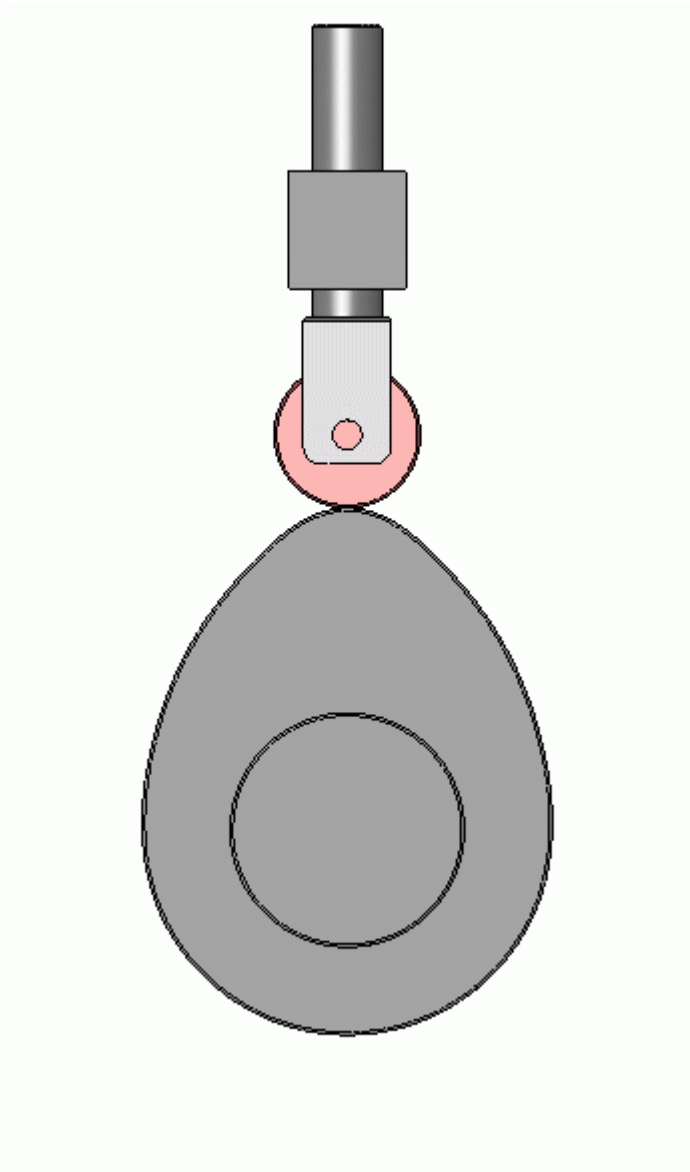
By V.Ryan

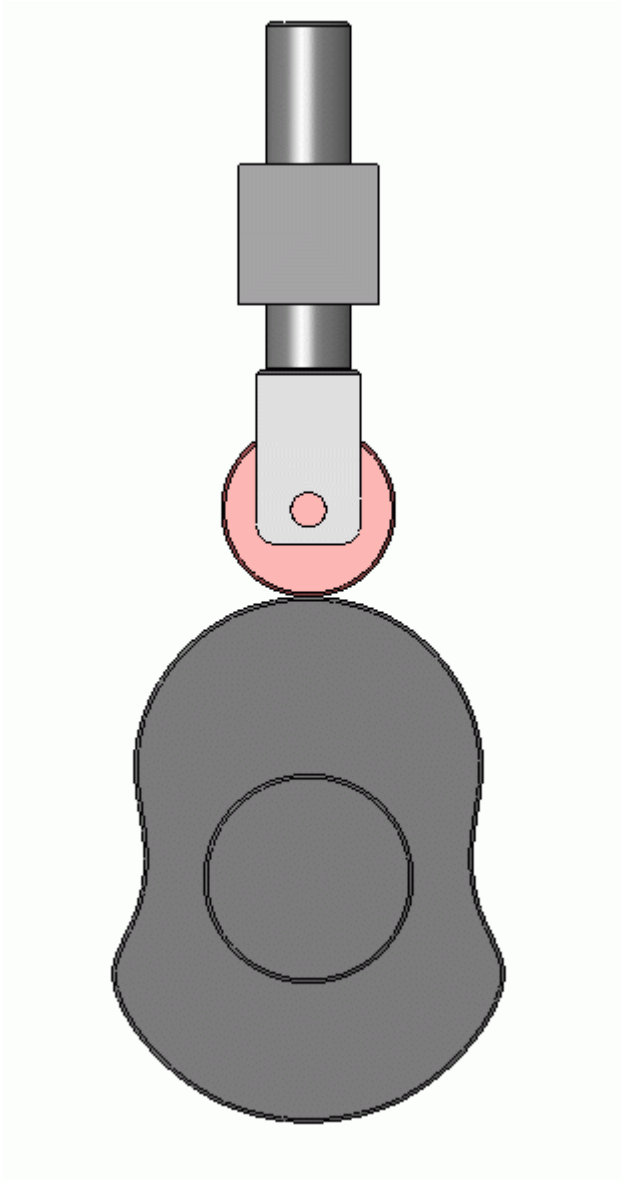
Плоска гърбица

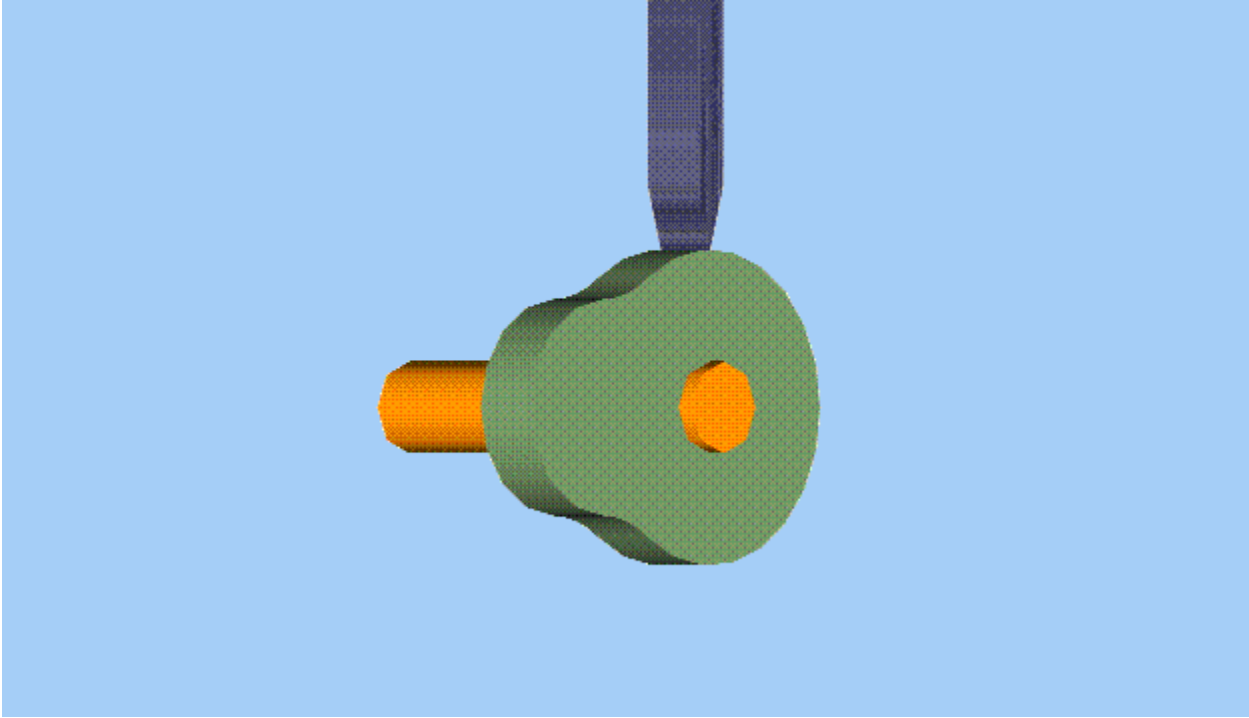


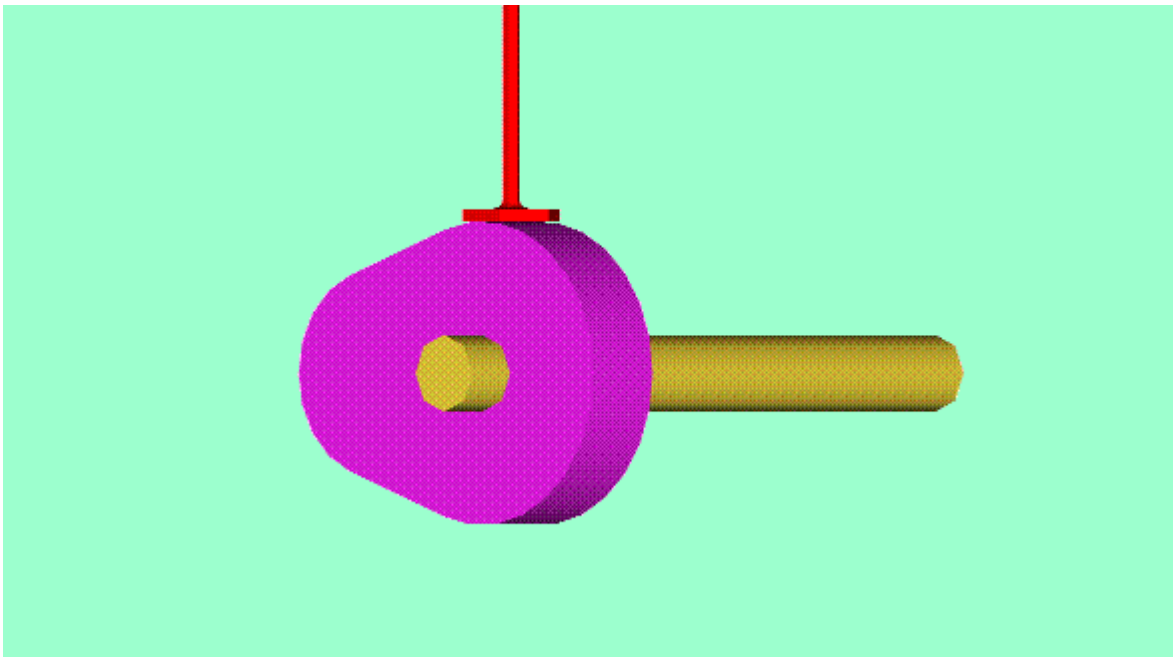


By V.Ryan

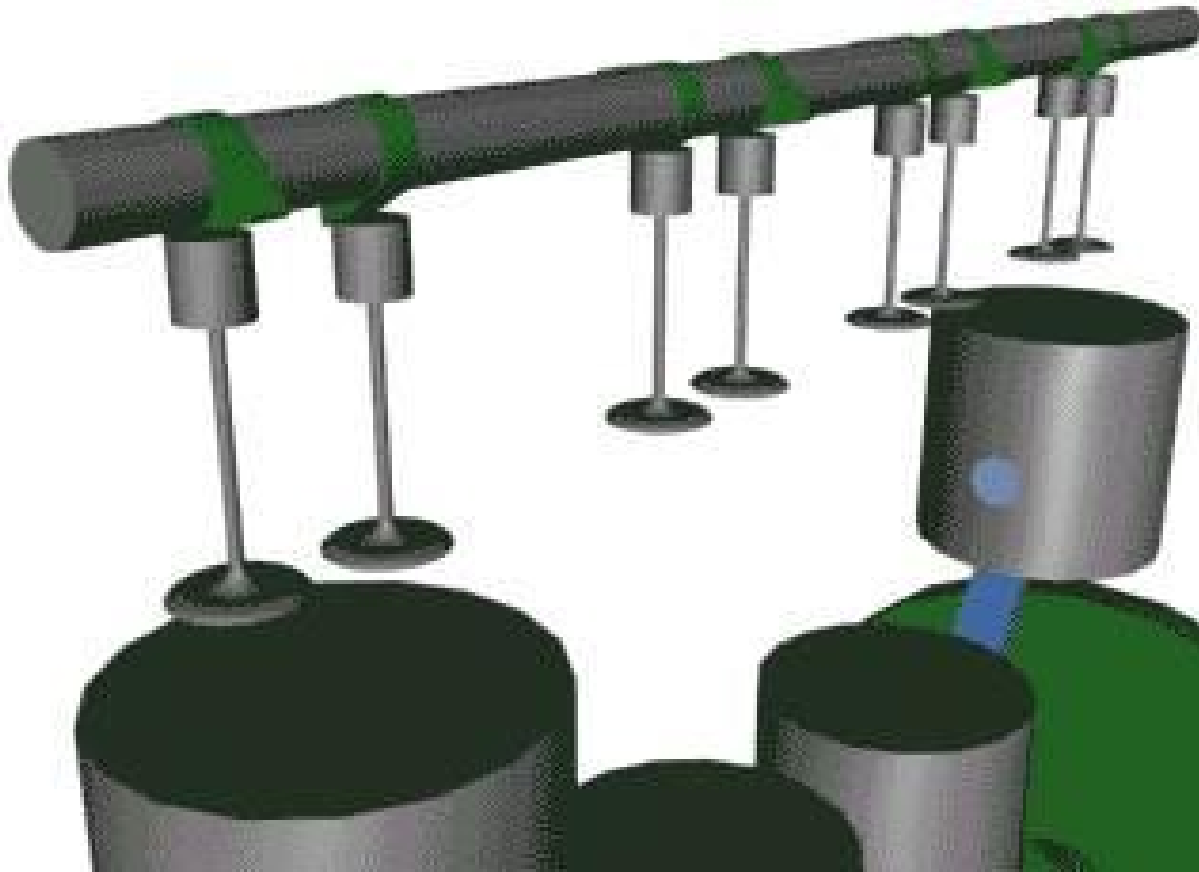




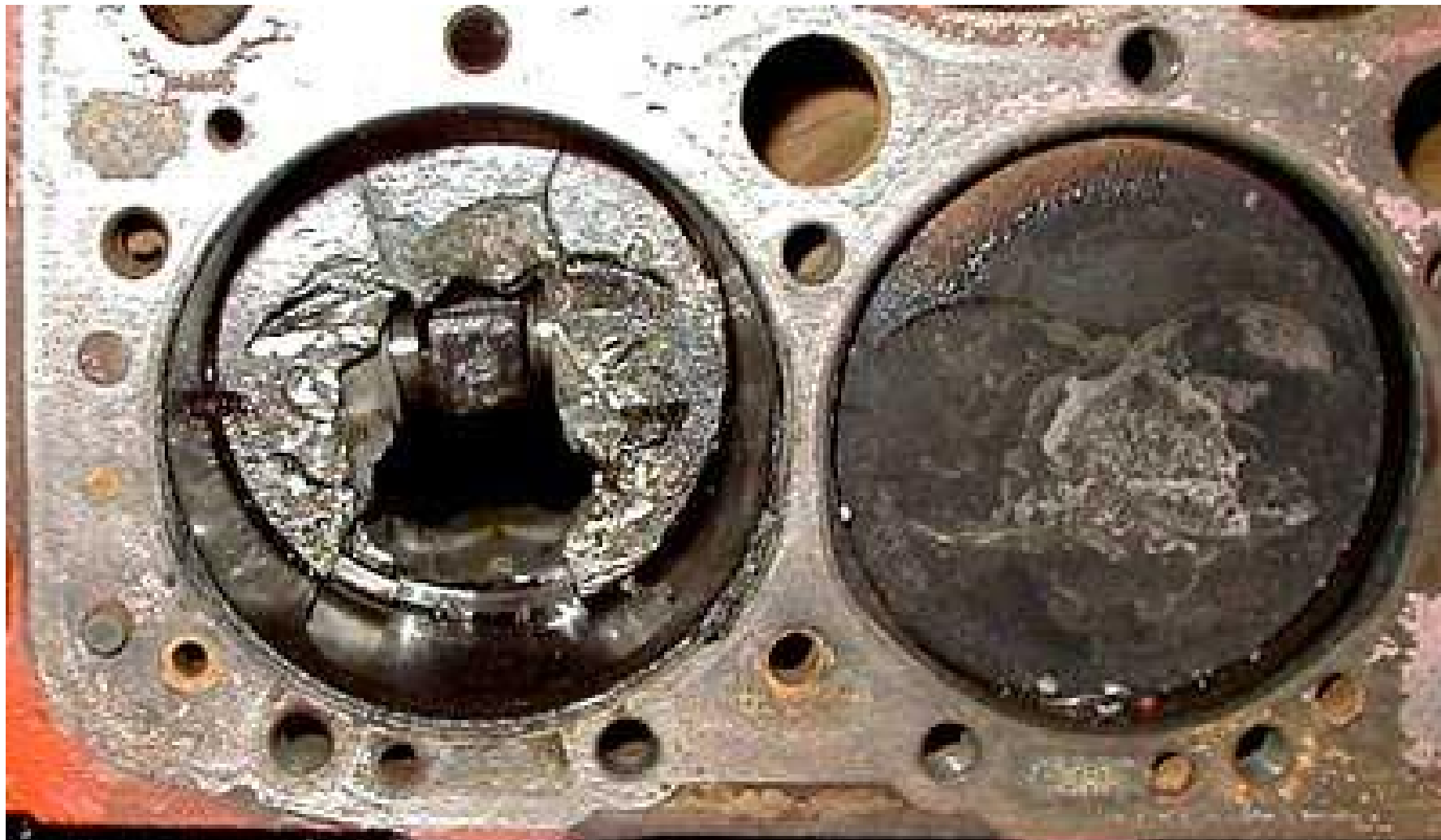


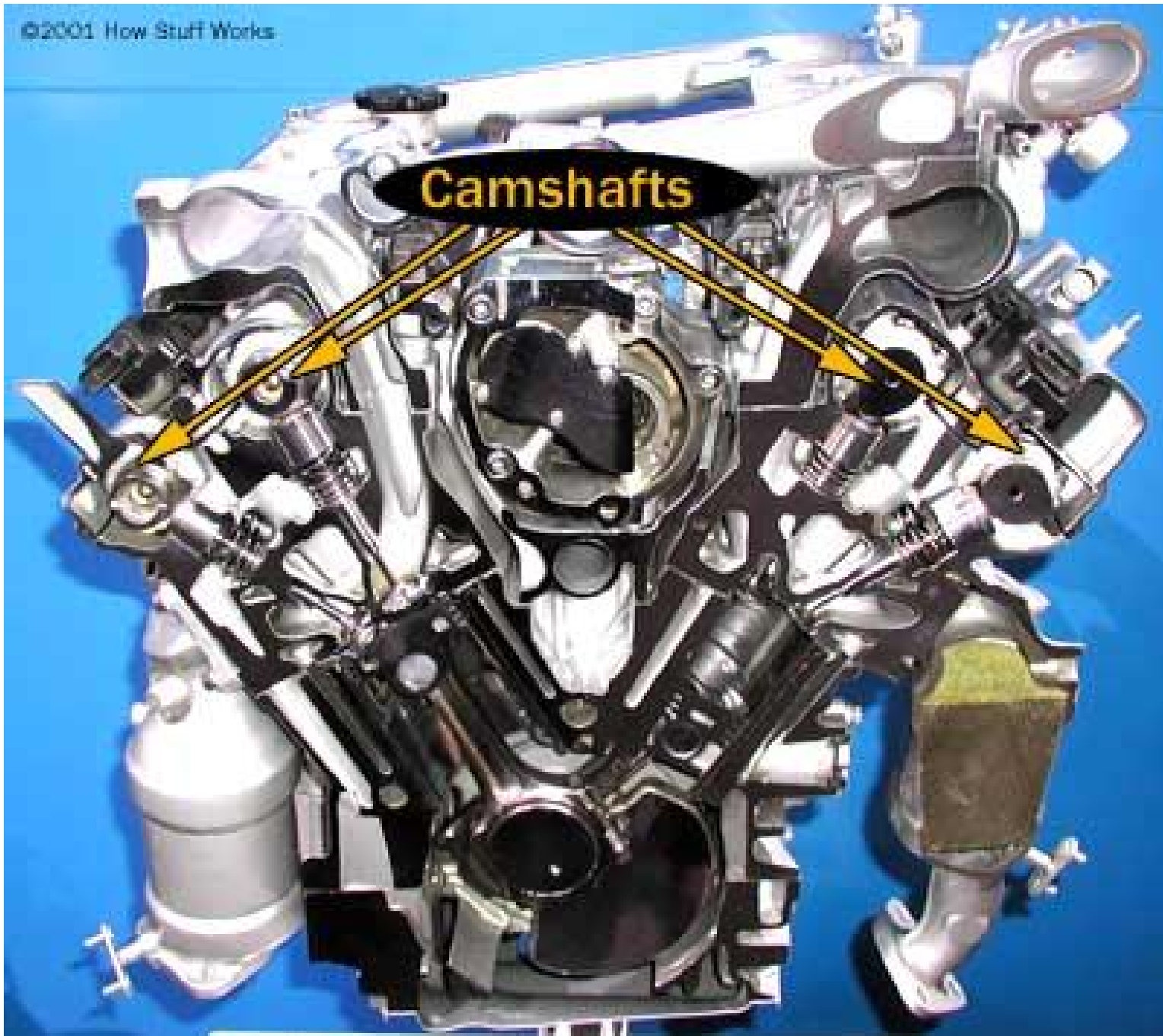


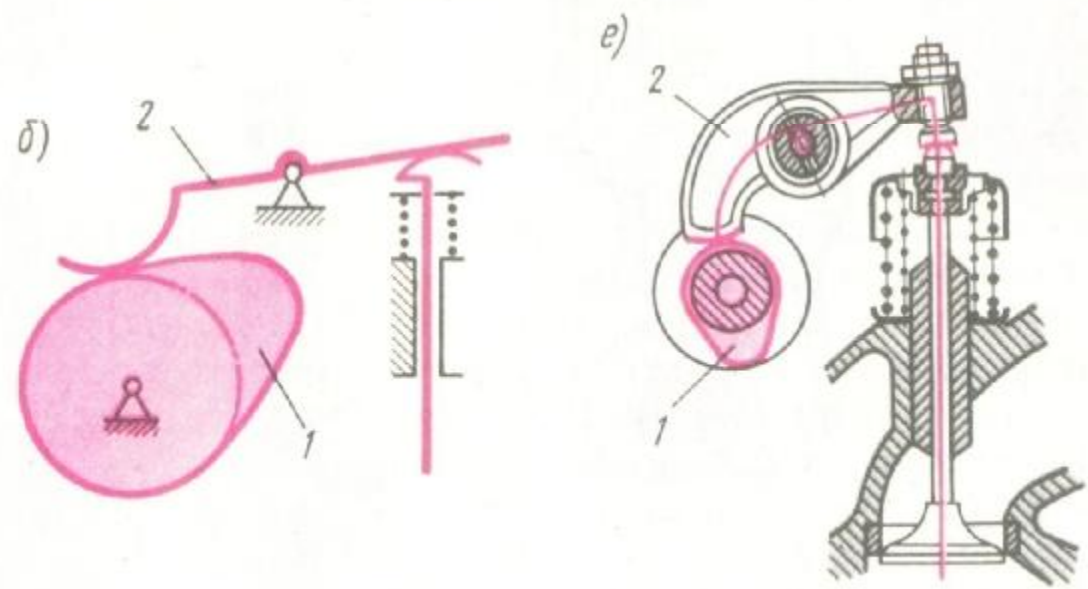
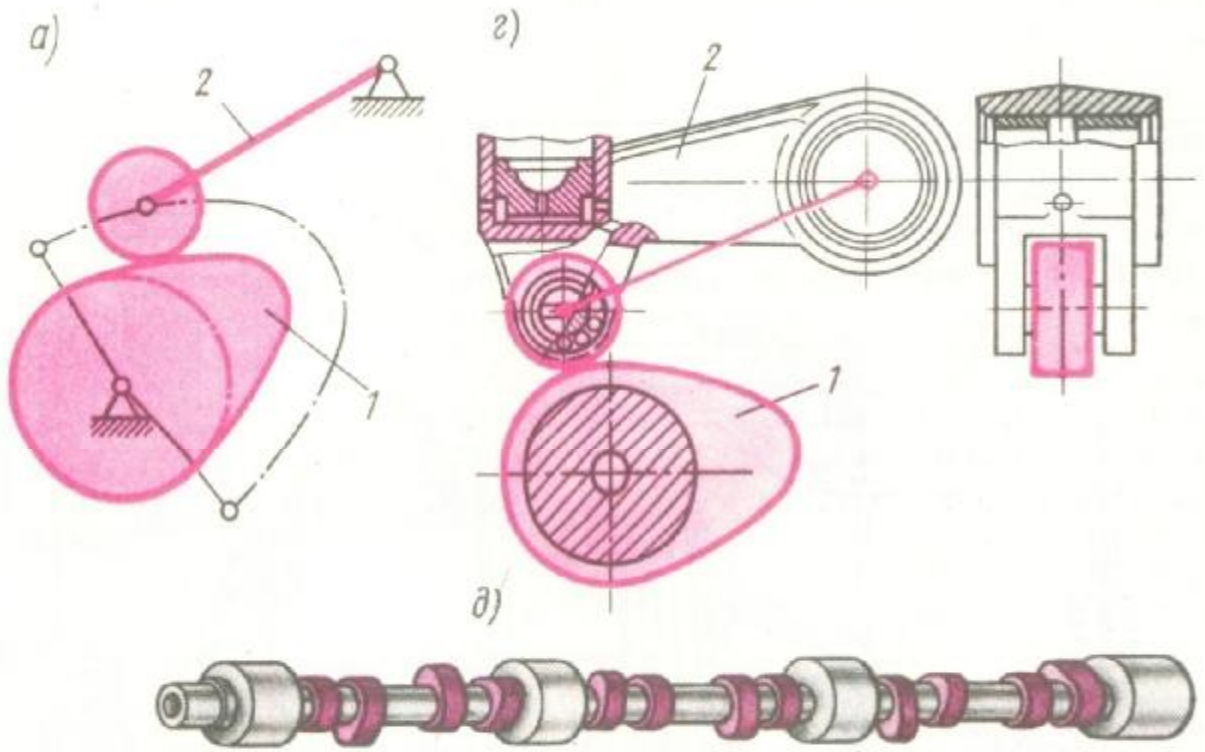
Механизми за газоразпределение

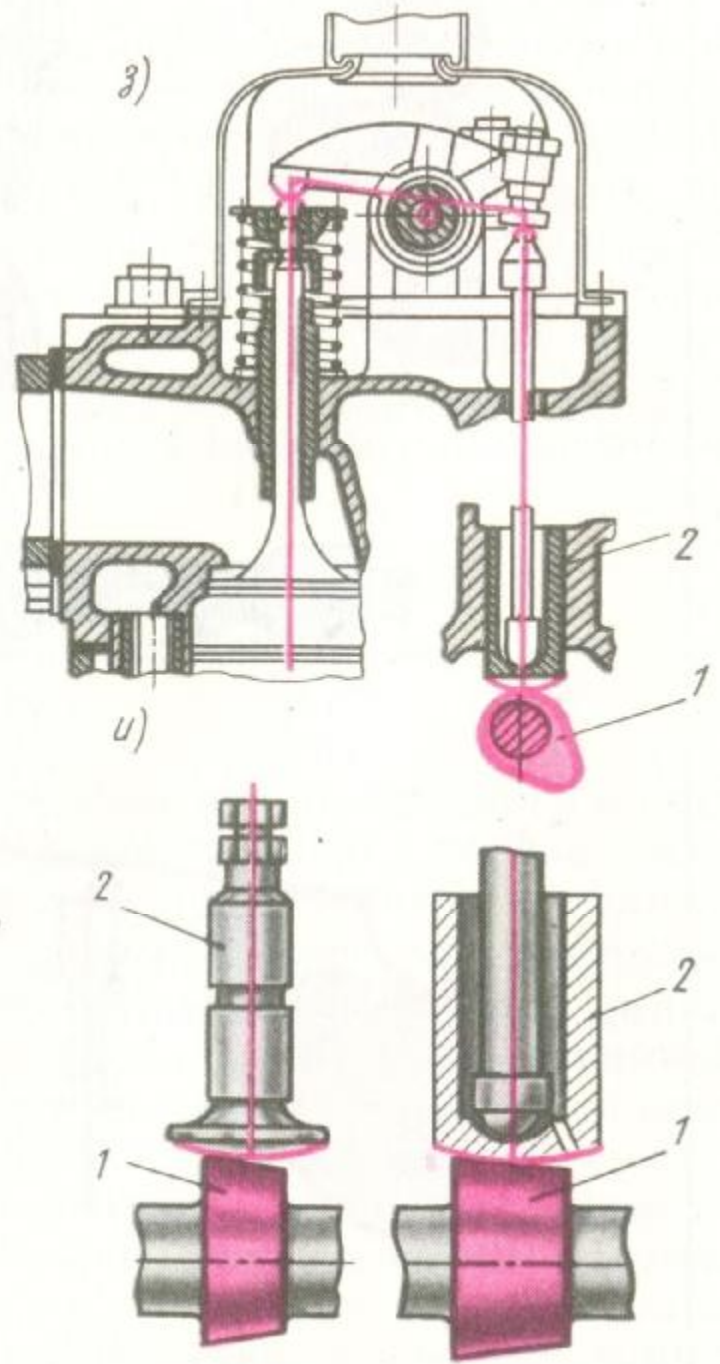
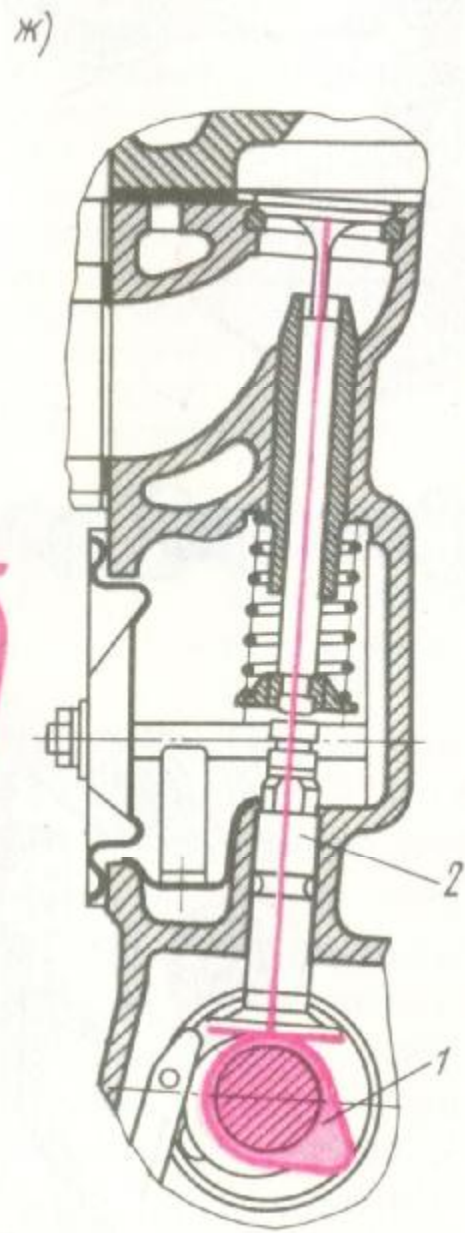
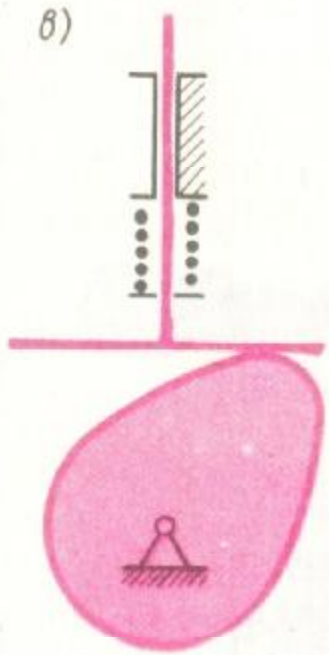


Повреди при грешка в работата на гърбичния механизъм



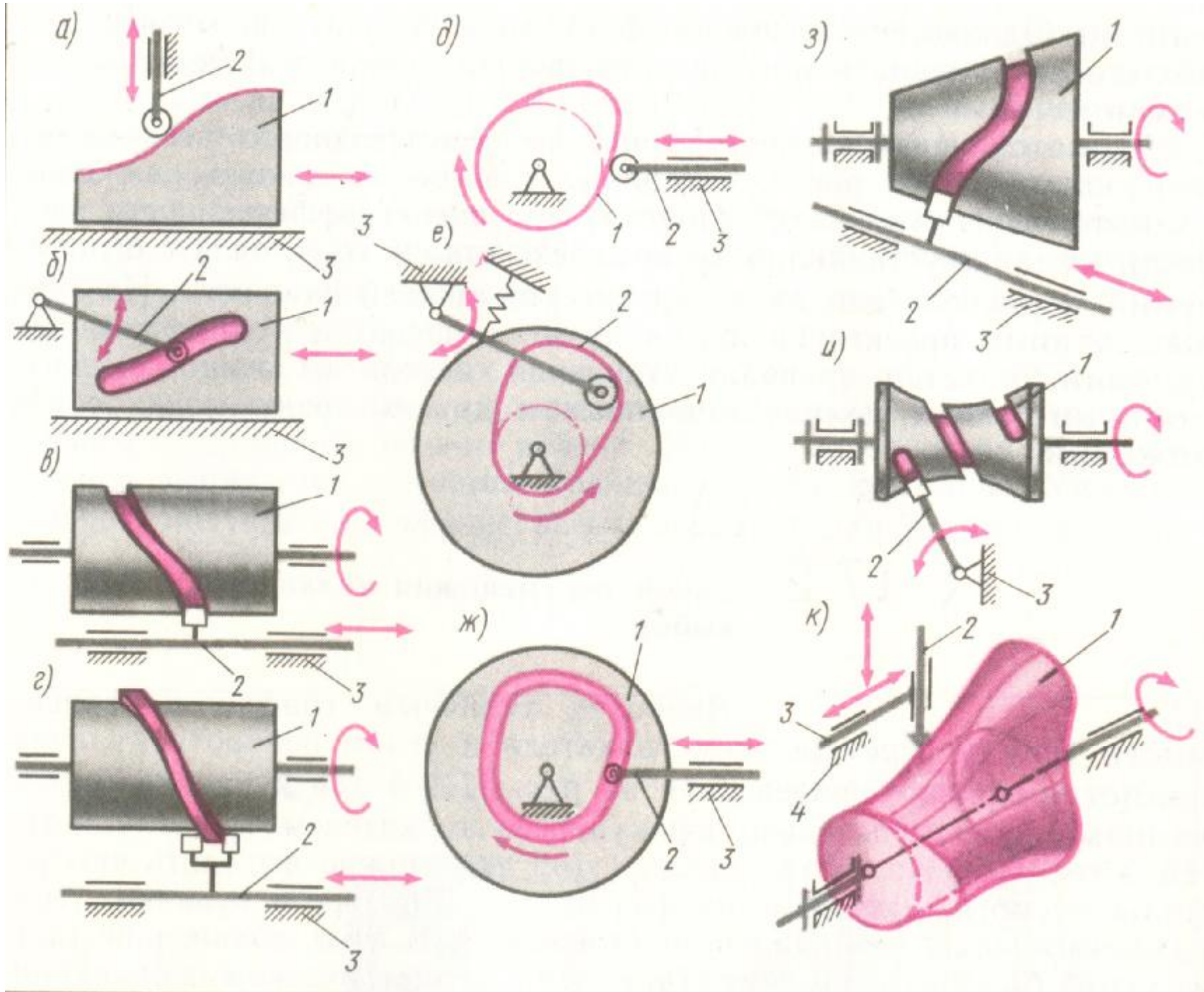






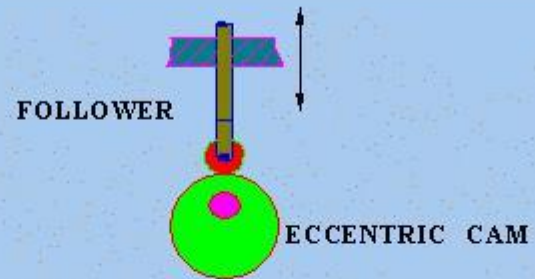
Видове гърбични механизми

- *а,б* - плоски с постъпателно преместване на гърбицата;
- *д,е,ж* – дискови;
- *з* – конични;
- *и* – хиперболоидни;
- *к* – коноидни.



Осигуряване на контакт

- геометрично затваряне за сметка на канали – *б,ж,и*;
- геометрично затваряне за сметка на обхващащи ролки – *г*;
- Силово затваряне чрез въздействие на сила:
 - силата на теглото,
 - еластичност на пружината ,
 - налягане на флуид или въздух.



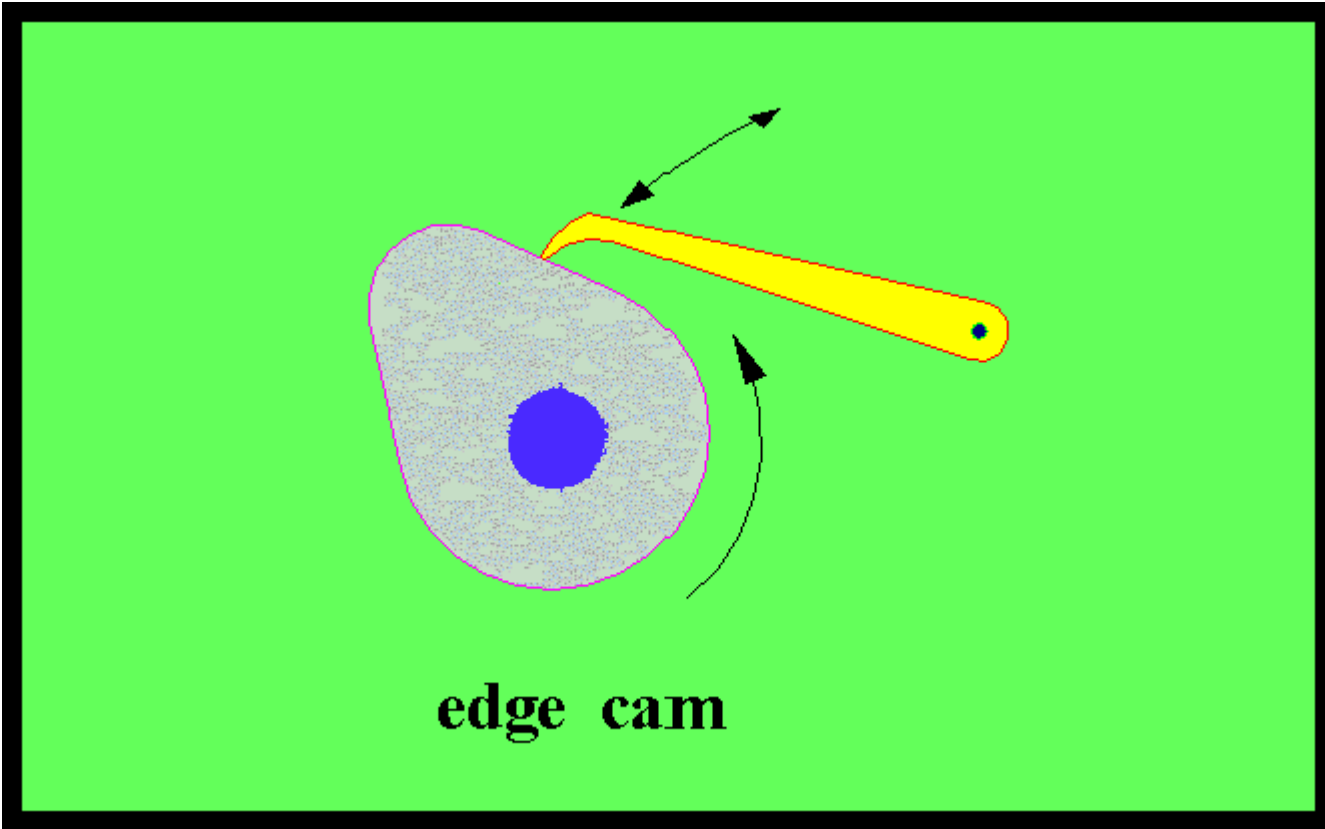
FOLLOWER

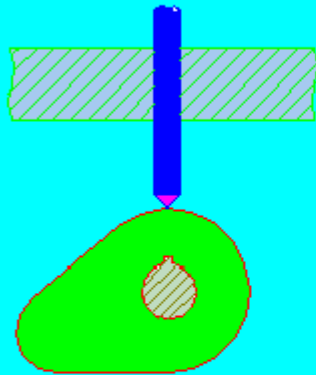
ECCENTRIC CAM

AN ECCENTRIC CAM ON A ROTATING SHAFT.

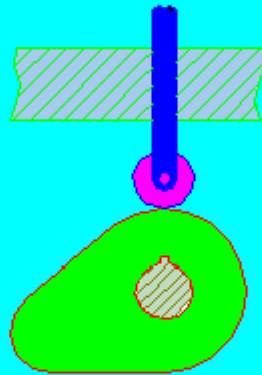


A CONCENTRIC DISC ON A ROTATING SHAFT.

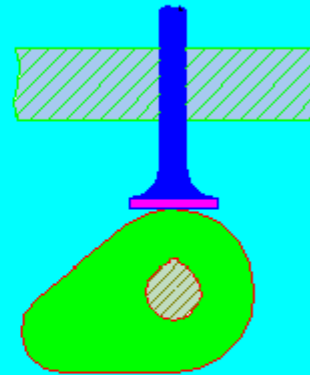




POINT OR
KNIFE EDGE
FOLLOWER



ROLLER
FOLLOWER



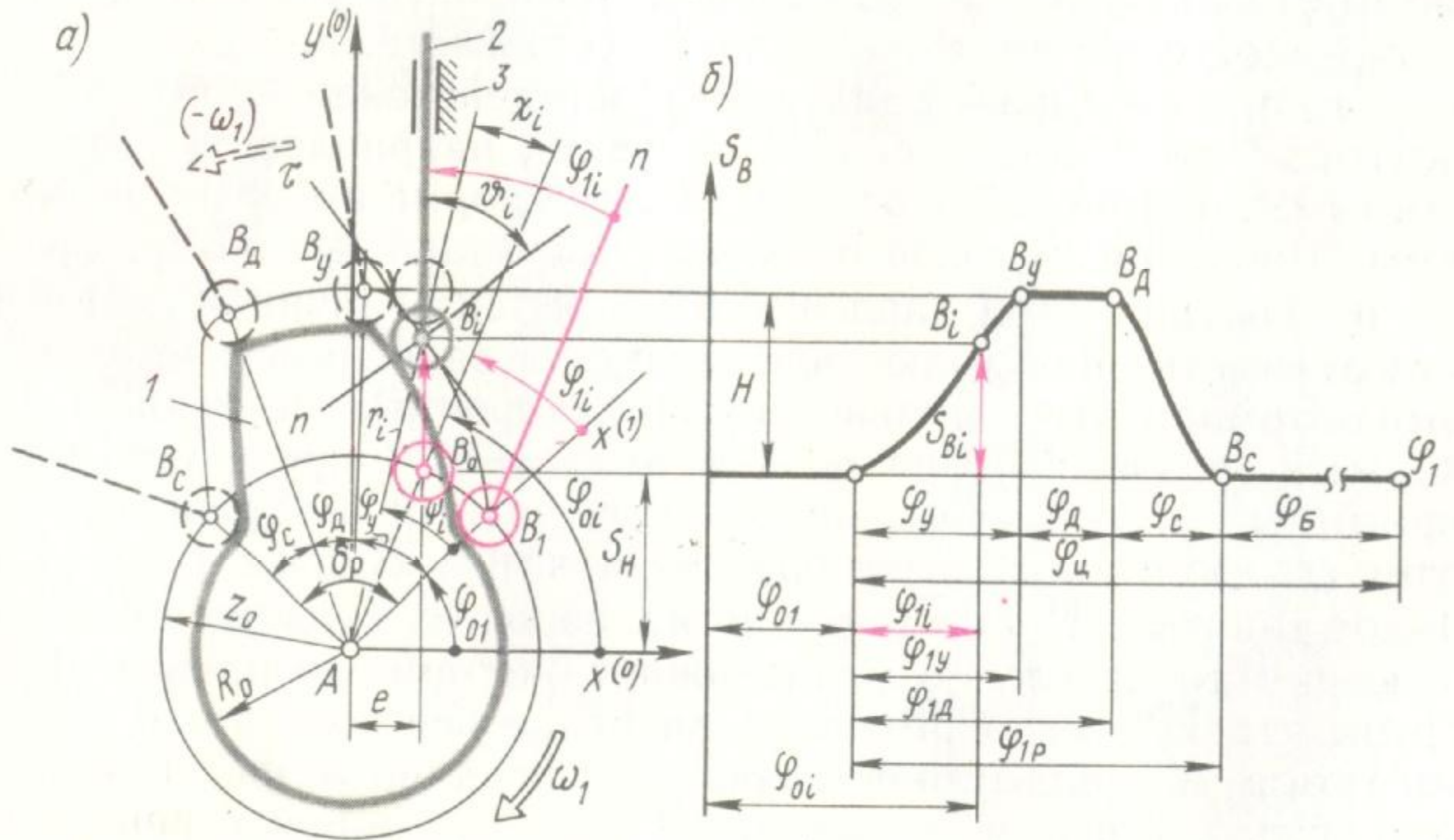
FLAT FACED
FOLLOWER

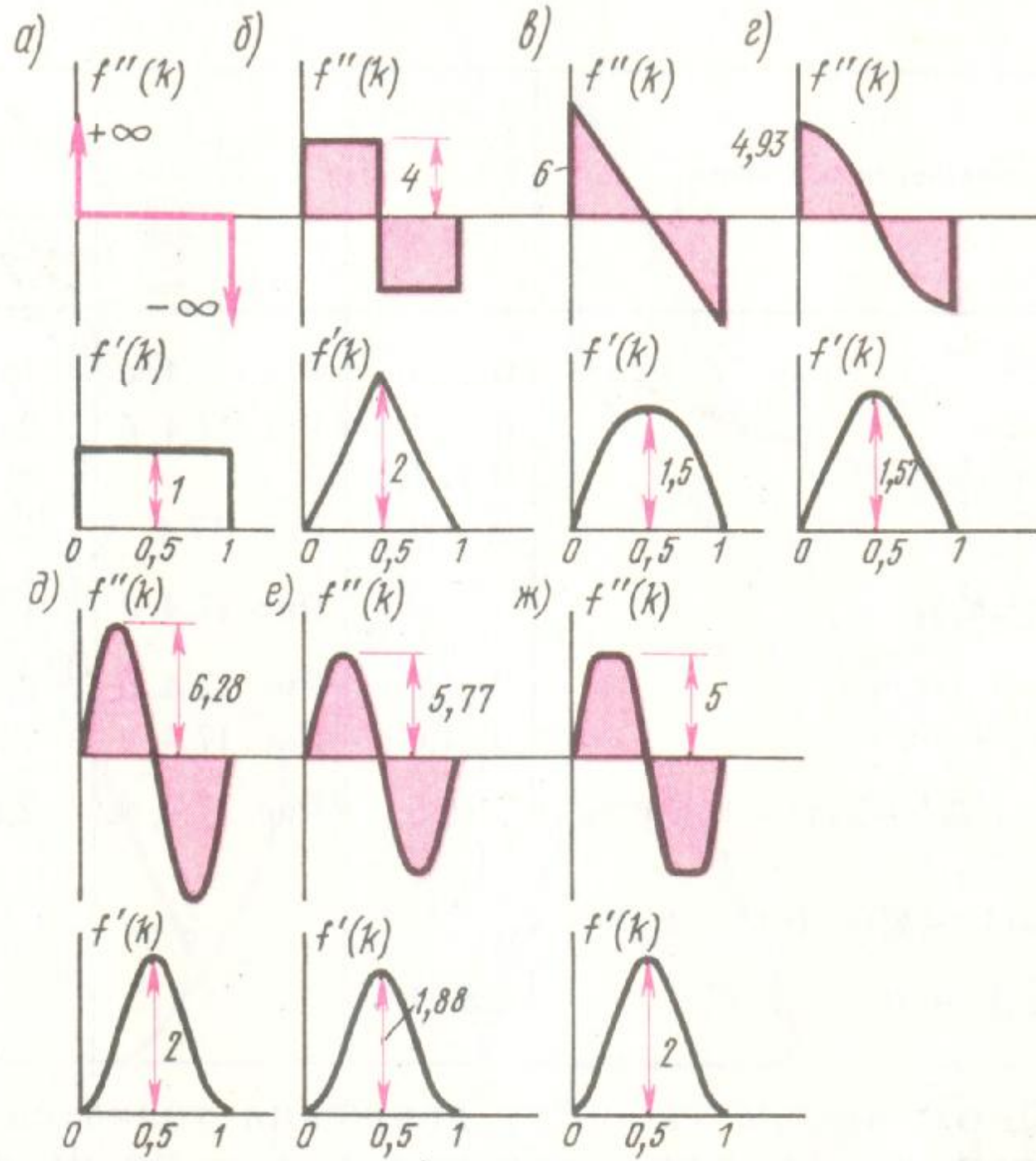
Съображения при конструирането на гърбици.

1. Закони за преместване на изпълнителното звено и избирането им.
2. Ъгъл на предаване на силите.
3. Определяне на размерите на гърбичен механизъм по зададен ъгъл на предаване на силата.

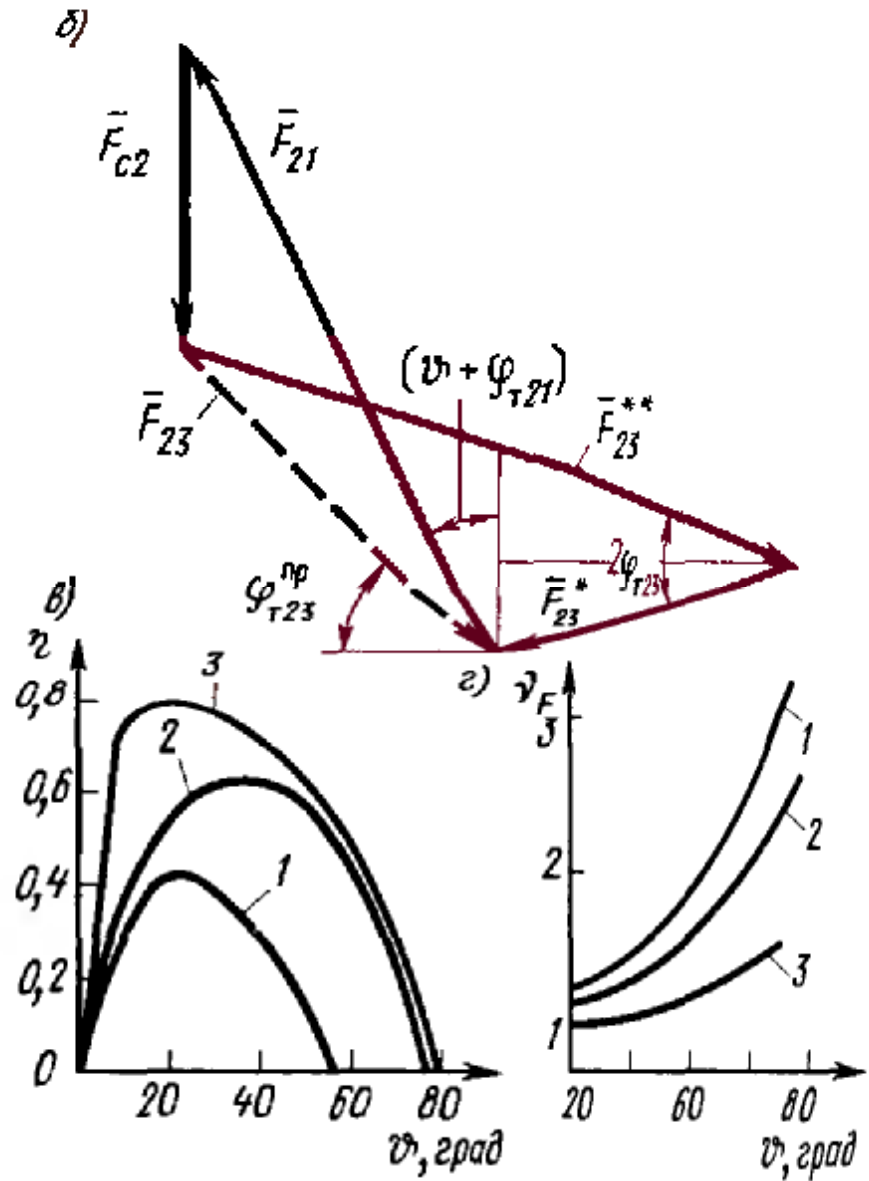
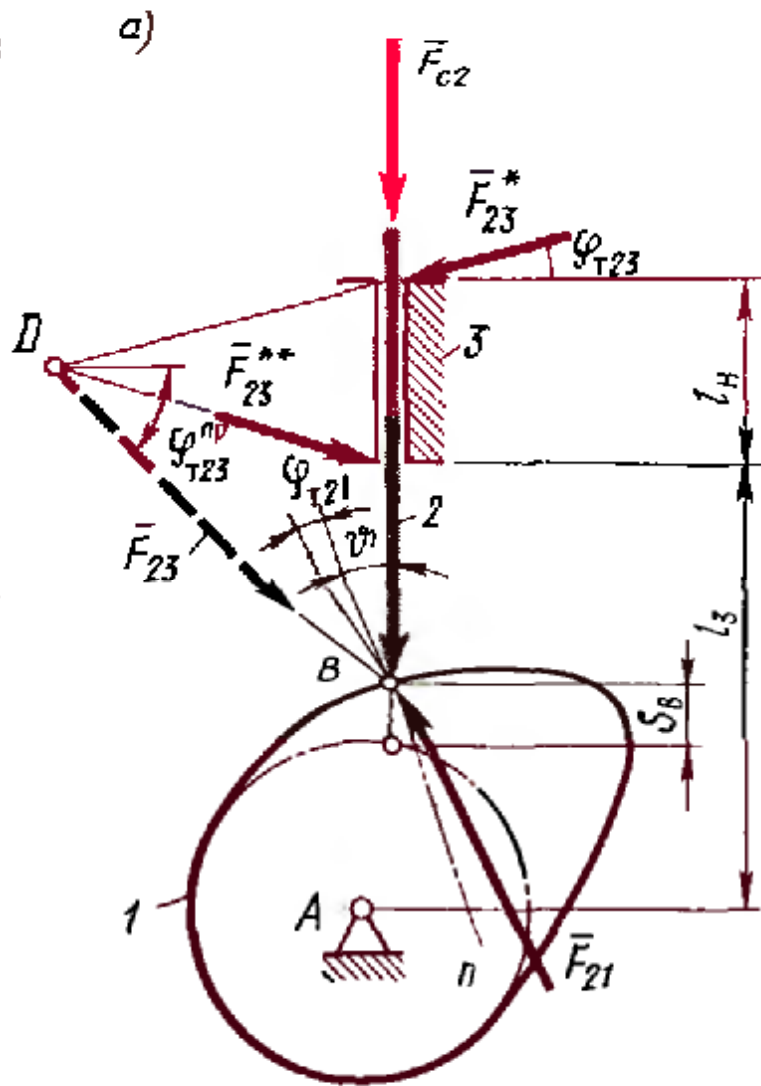
Закони за преместване на
изпълнителното звено и
избирането им.

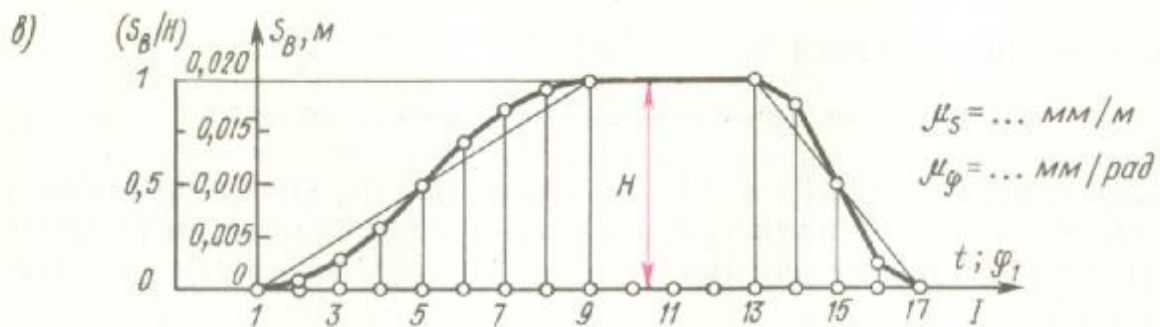
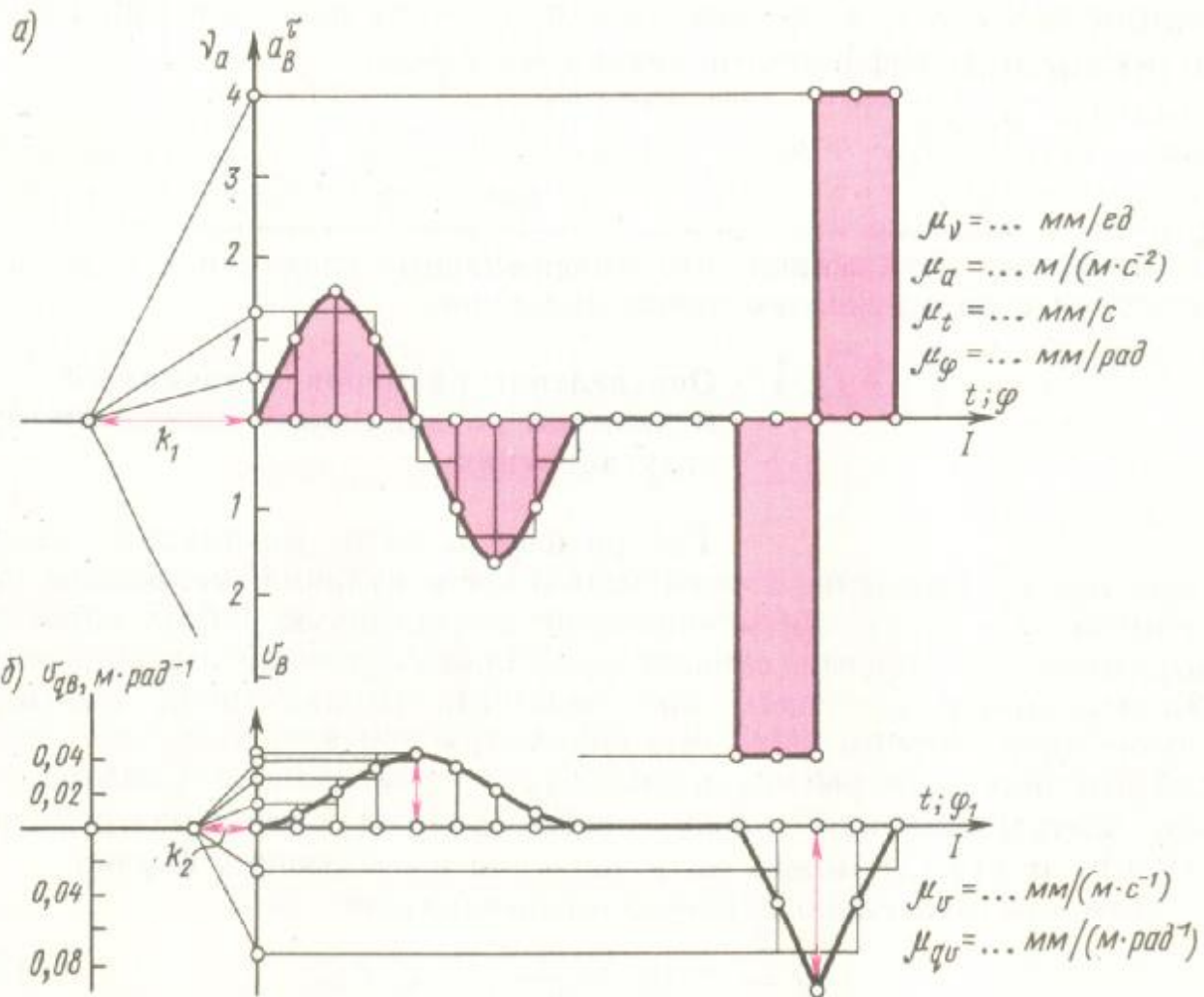
Типична графика на зависимостта на преместването на изпълнителното звено от ъгъла на завъртане на гърбицата



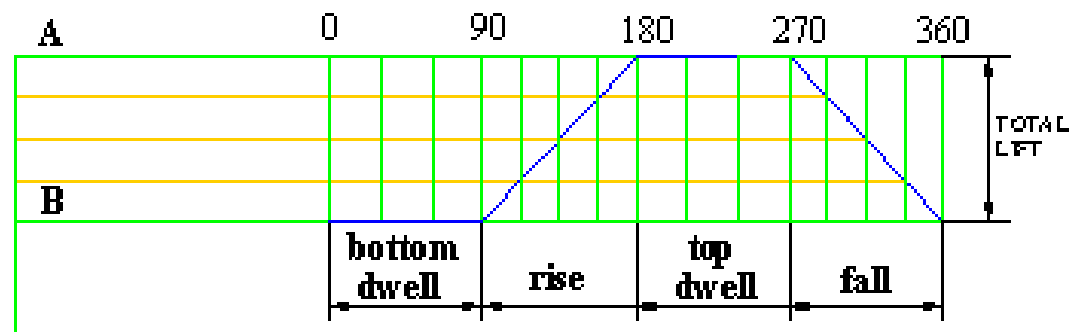


Ъгъл на предаване на силите.





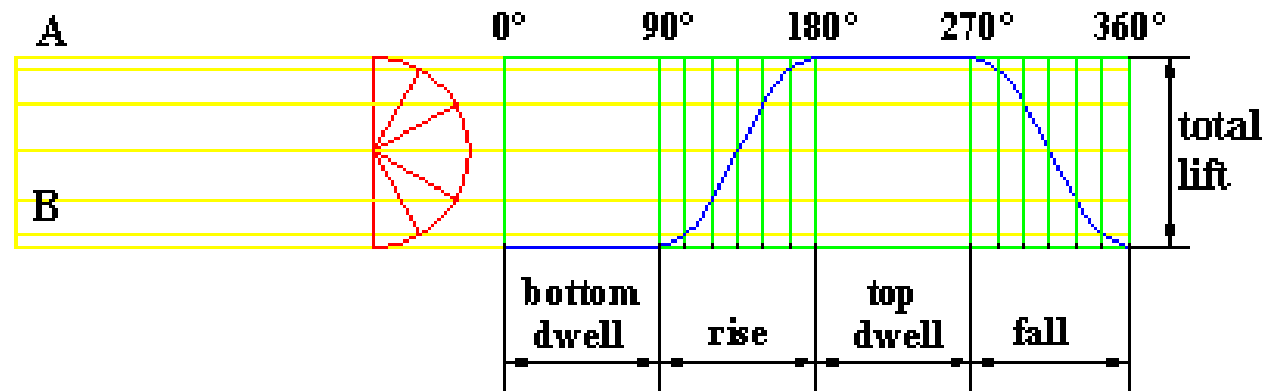
Профилиране на плъзгач с острие



A) draw the follower performance graph

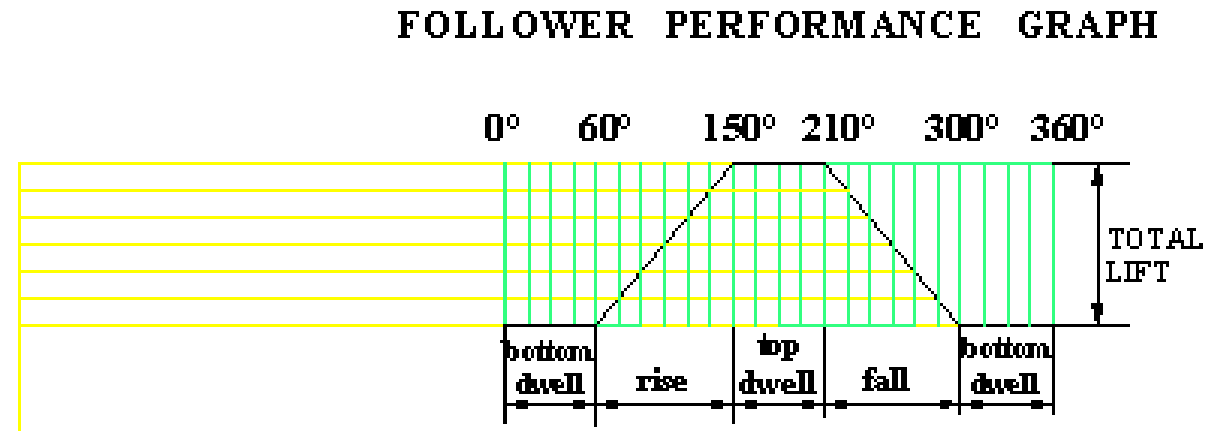
Профилиране на плъзгач с ролка и без ексцентрицитет

FOLLOWER PERFORMANCE GRAPH



A) draw the follower performance graph.

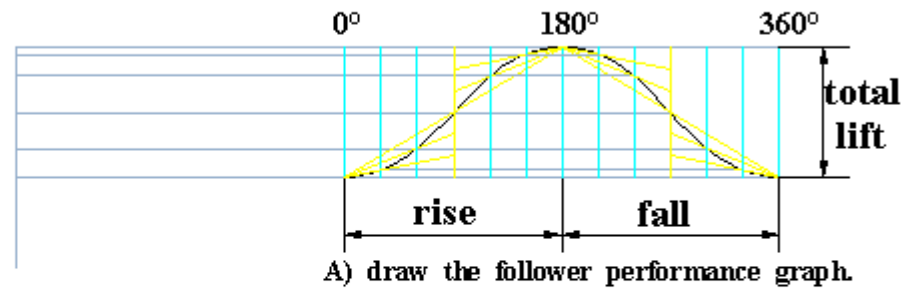
Профилиране на плъзгач с ролка и без ексцентрицитет



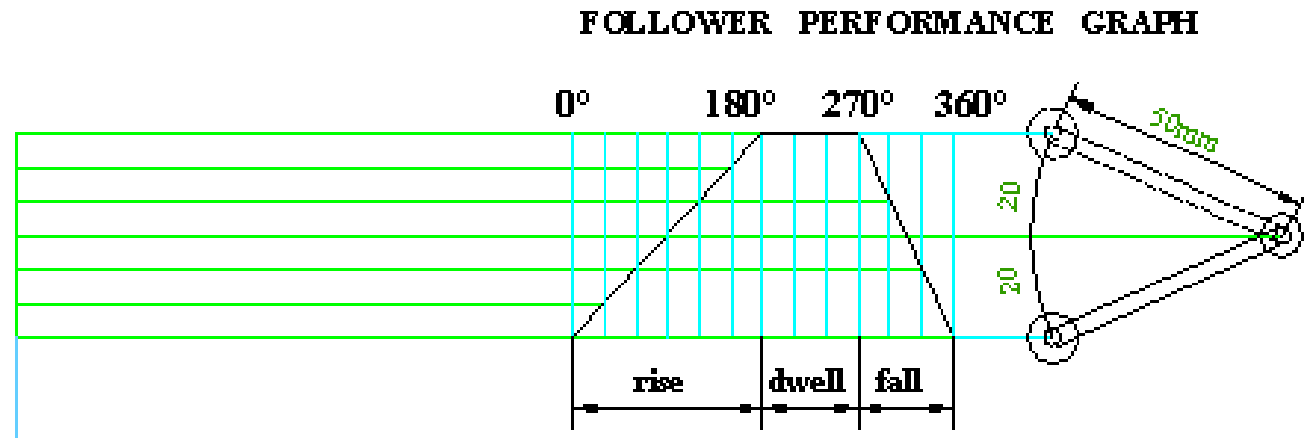
A) draw the follower performance graph.

Профилиране на плъзгач с плоско изпълнително звено (тарелка)

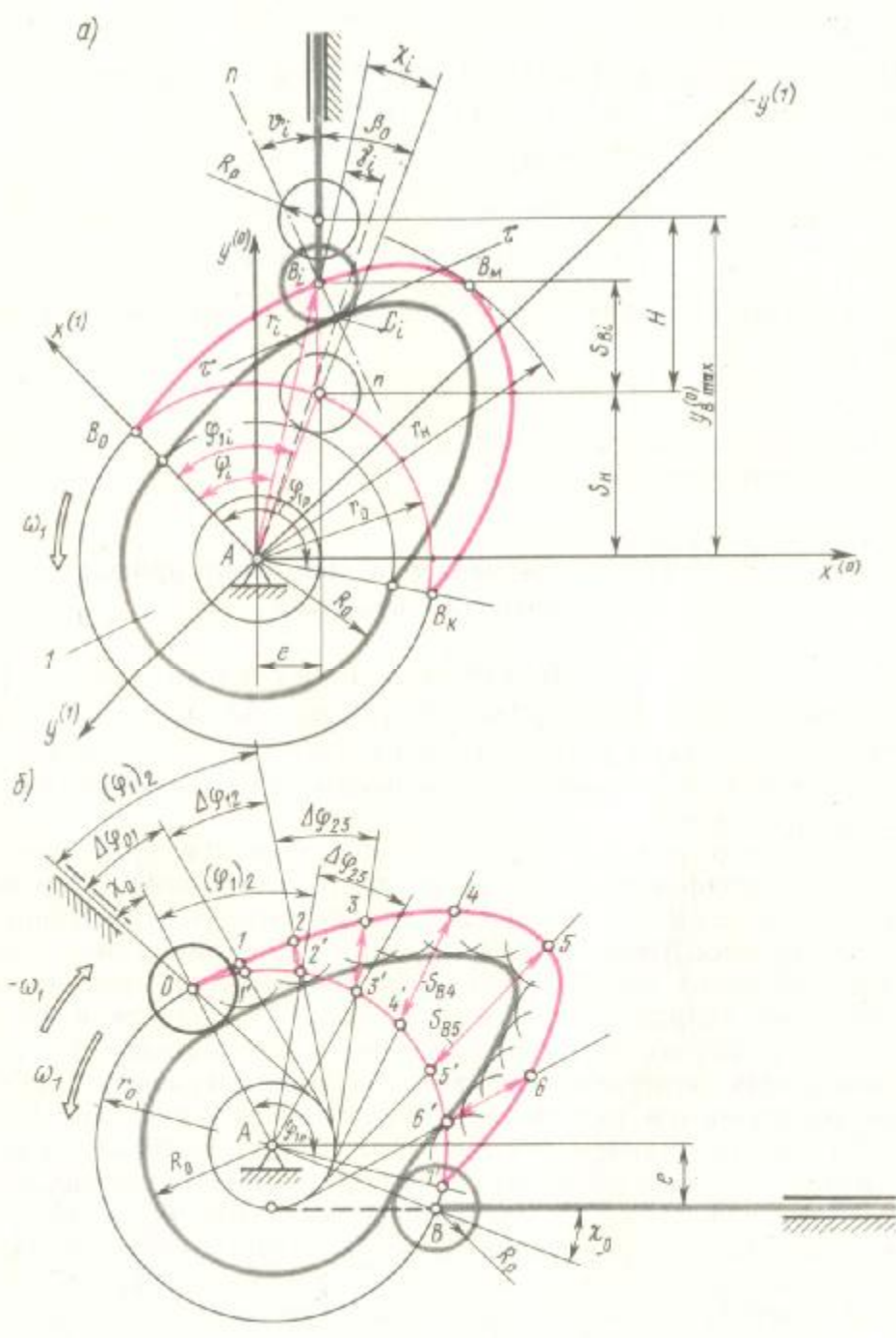
FOLLOWER PERFORMANCE GRAPH

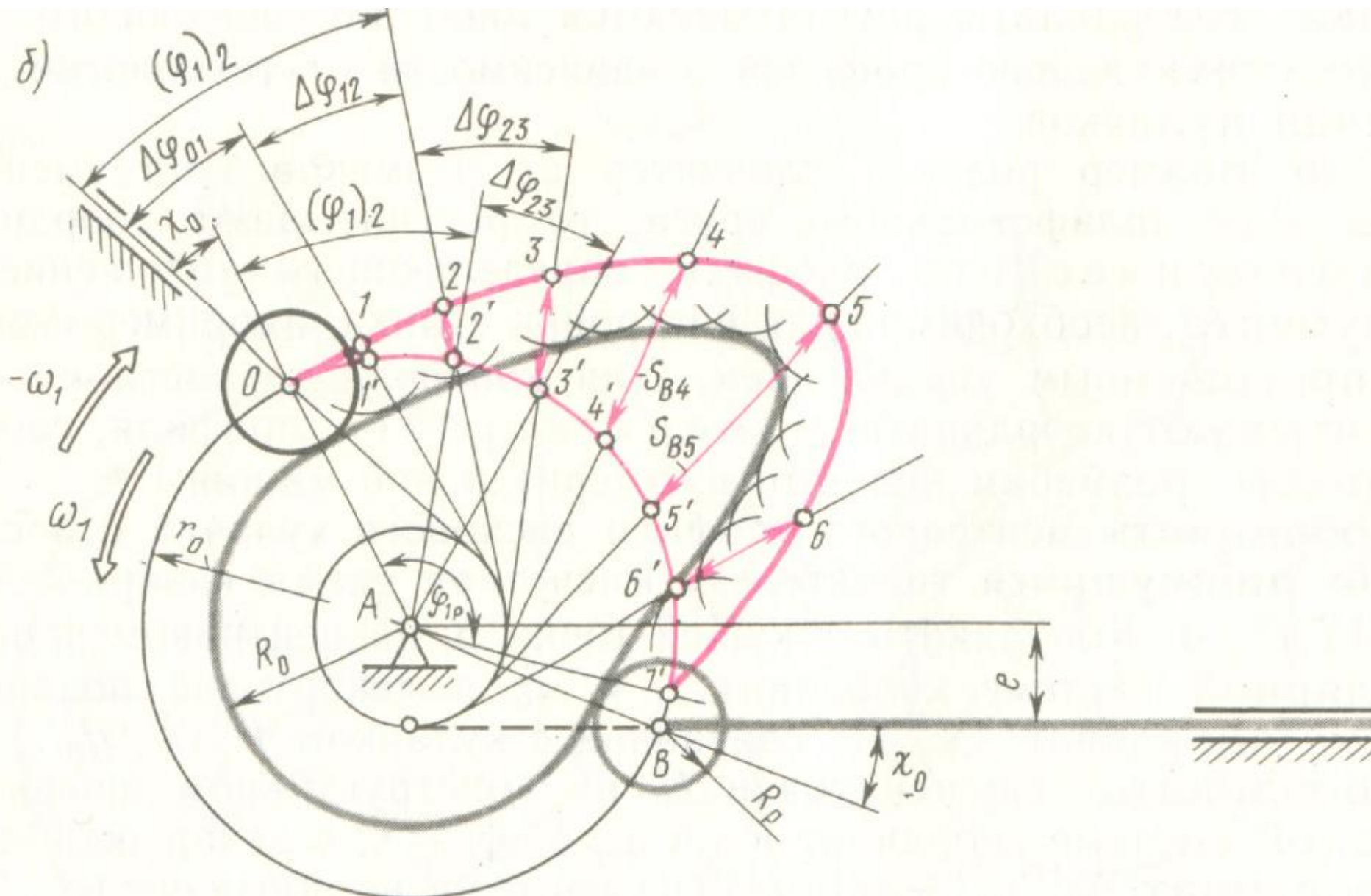


Профилиране на плъзгач с кобилица с ролка



A) draw the follower performance graph.





Определяне на размерите на
гърбичен механизъм по
зададен ъгъл на предаване на
силата.

координаты точки B_i на центровом профиле:

$$r_i = \sqrt{e^2 + (S_n + S_{Bi})^2}; \quad (17.17)$$

$$r_n = \sqrt{e^2 + (S_n + H)^2} \quad (17.18)$$

(следует учитывать, что при переходе от системы координат $x^{(2)}B_0y^{(2)}$ к системе $x^{(1)}Ay^{(1)}$ меняется знак смещения: $e^{(1)} = -e^{(2)}$);

$$\beta_0 = \text{arctg}(e/S_n);$$

$$\chi_i = \text{arctg}[(S_n + S_{Bi})/e] - \text{arctg}(S_n/e). \quad (17.19)$$

При отсчете углов по часовой стрелке от оси $Ax^{(1)}$ (см. рис. 17.12, а) и смещении оси толкателя $e > 0$:

$$\psi_i = \varphi_{li} - \chi_i; \quad (17.20)$$

$$x_{Bi}^{(1)} = r_i \cos \psi_i; \quad (17.21)$$

$$y_{Bi}^{(1)} = -r_i \sin \psi_i. \quad (17.22)$$

Координаты точки C_i на конструктивном профиле:

$$\vartheta_i = \text{arctg}[(v_{qBi} - e)/(S_n + S_{Bi})]; \quad (17.23)$$

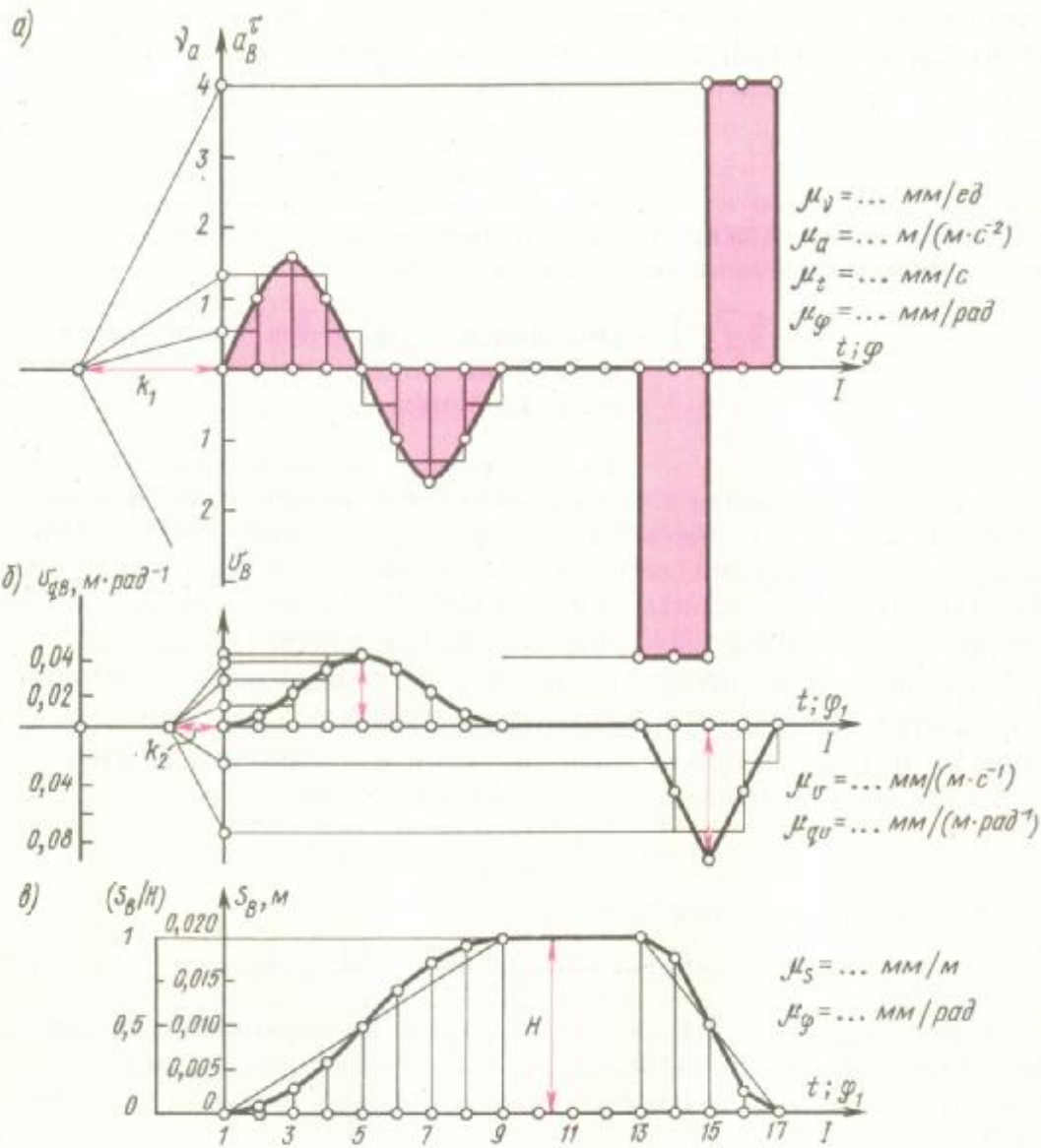
$$R_{Ci} = \sqrt{R_p^2 + r_i^2 - 2R_p r_i \cos(\vartheta_i + \beta_0 - \chi_i)}; \quad (17.24)$$

$$\gamma_i = \arccos[(r_i^2 + R_{Ci}^2 - R_p^2)/(2r_i R_{Ci})]; \quad (17.25)$$

$$\psi_{Ci} = \psi_i + \gamma_i; \quad (17.26)$$

$$x_{Ci}^{(1)} = R_{Ci} \cos \psi_{Ci}; \quad (17.27)$$

$$y_{Ci}^{(1)} = -R_{Ci} \sin \psi_{Ci}. \quad (17.28)$$



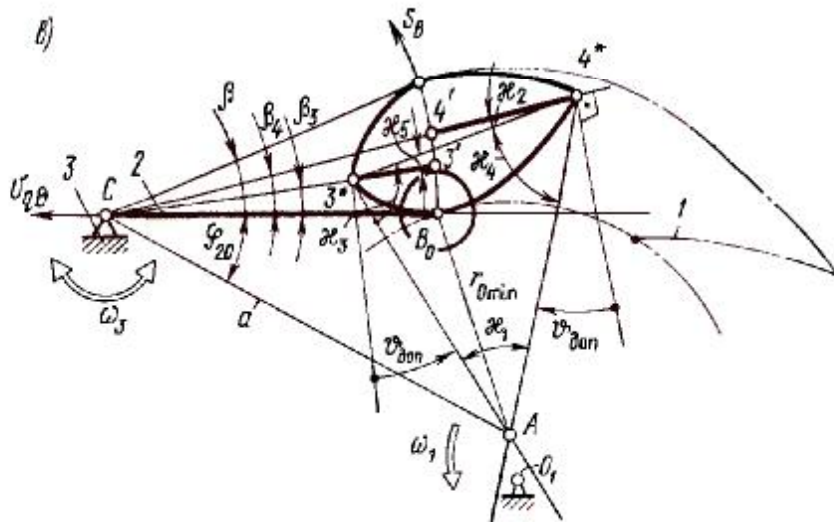
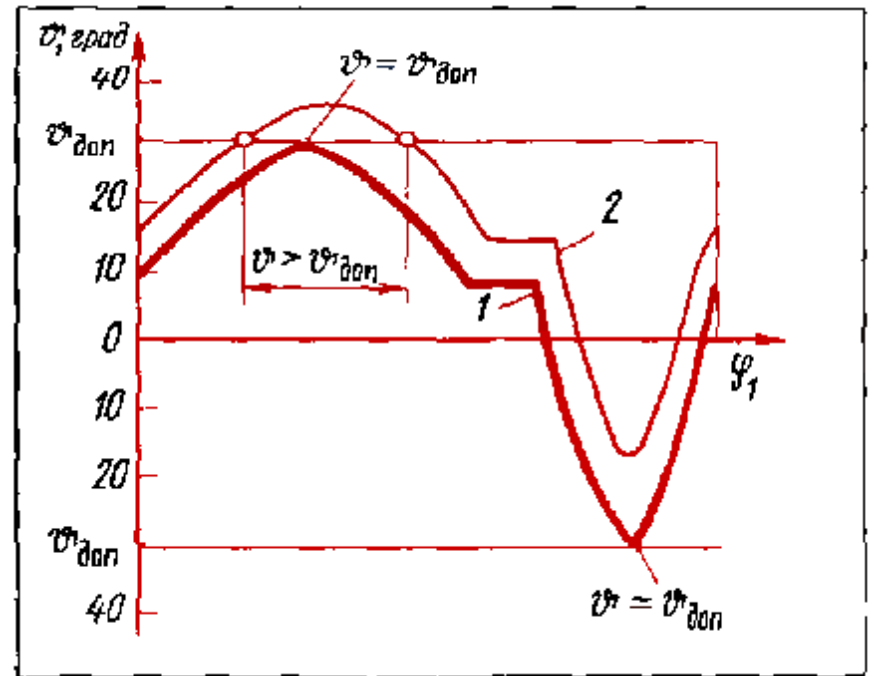
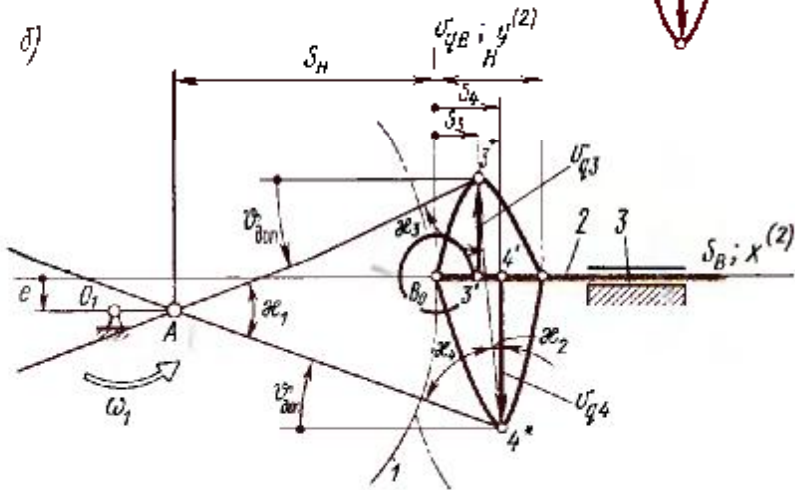
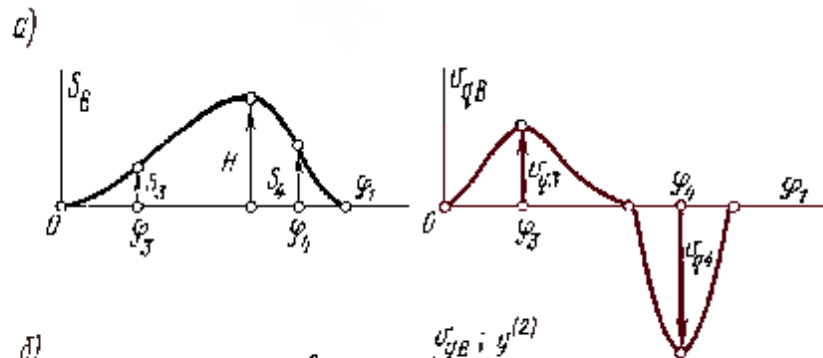
$$S'' = f(j, b_1)$$

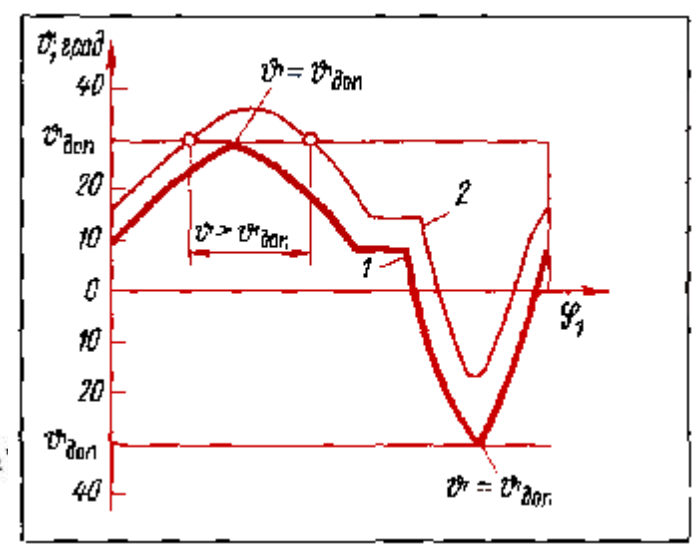
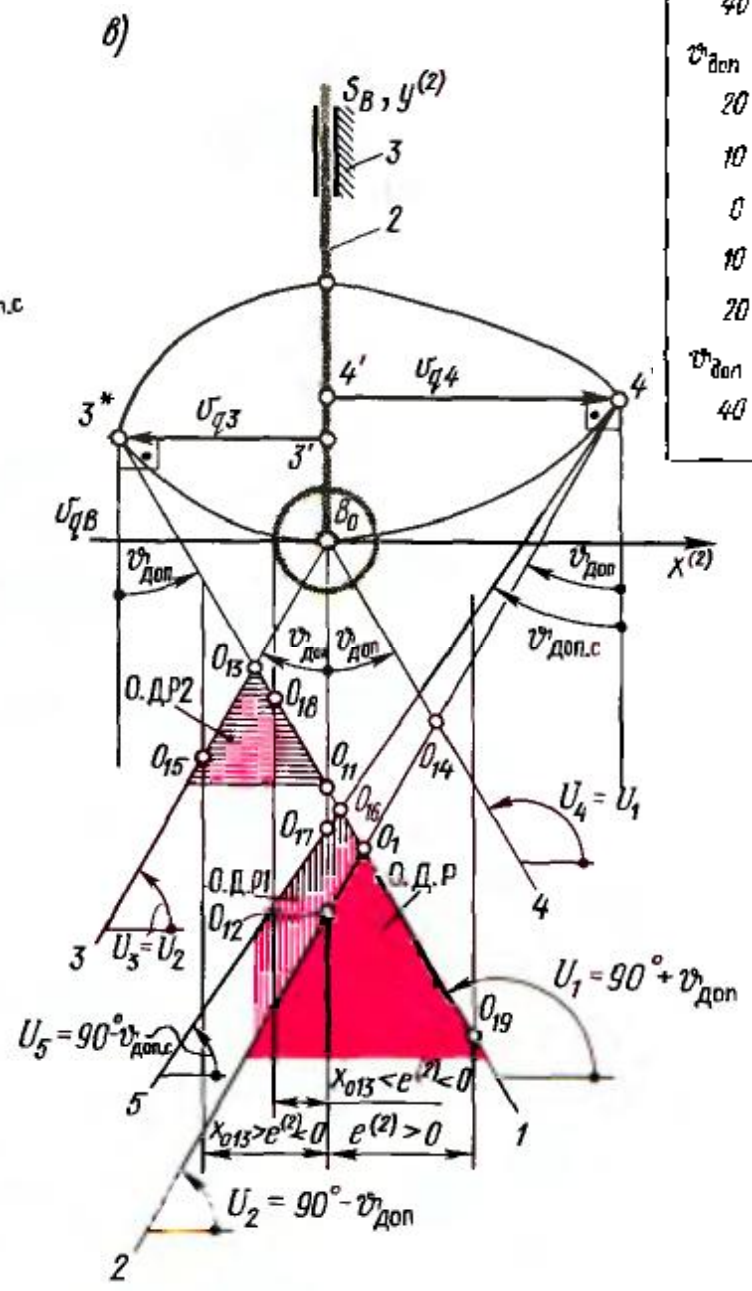
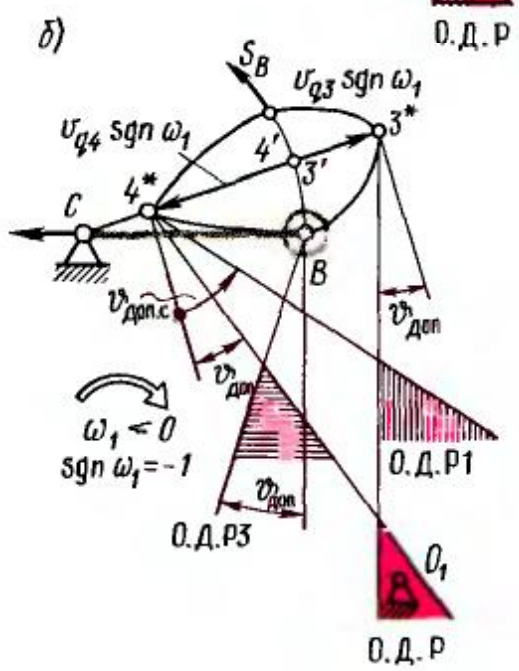
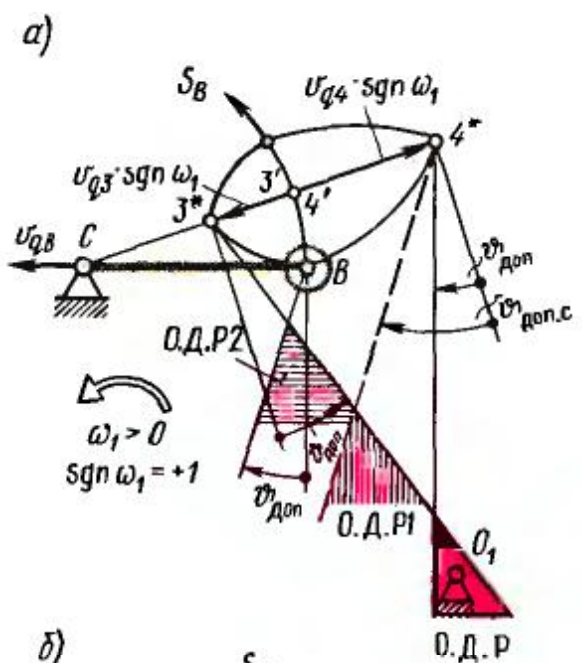
$$S' = \int f(j, b_1) dj + C_1$$

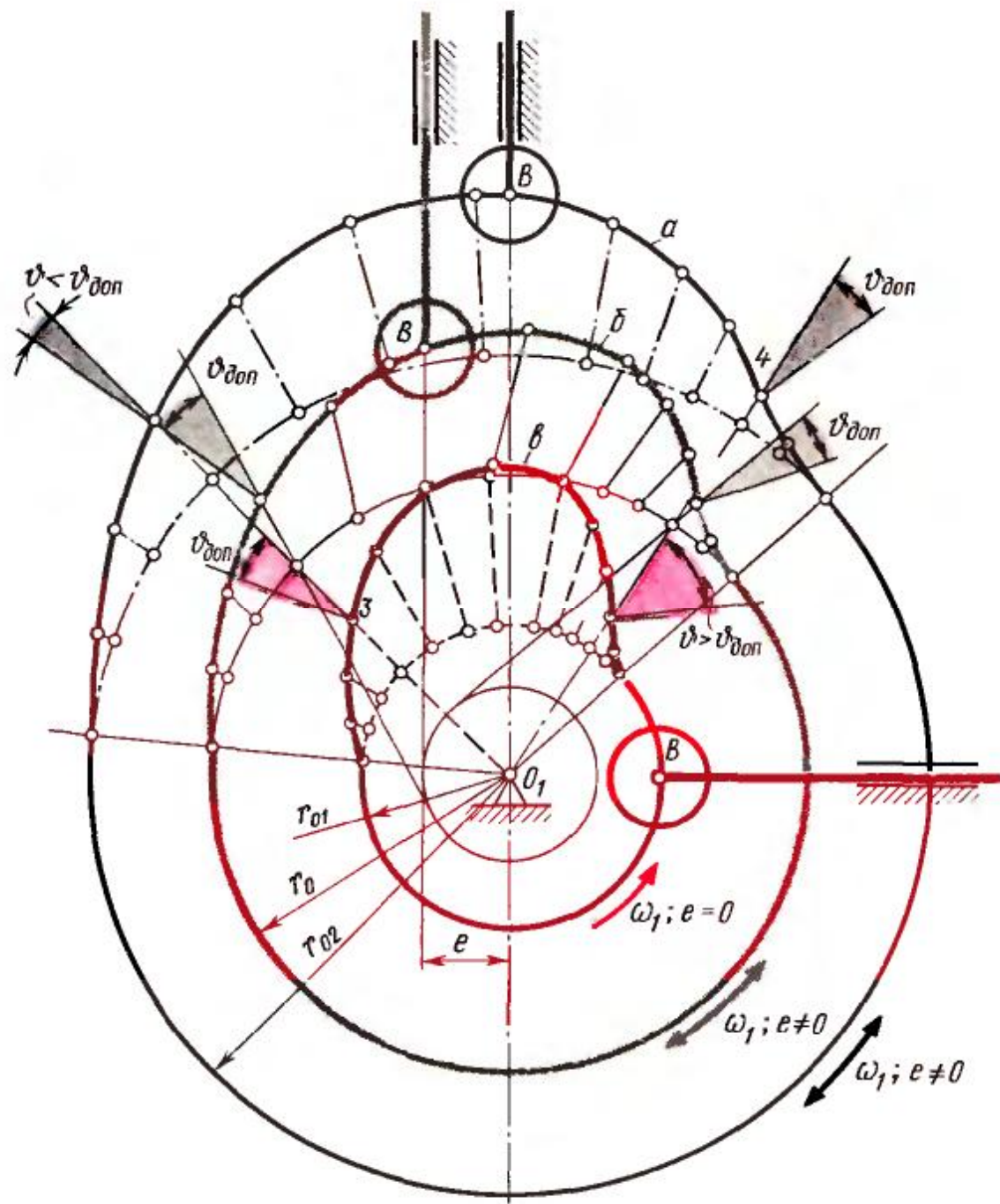
$$S = \int S' + C_2 =$$

$$= \int \left(\int f(j, b_1) dj + C_1 \right) + C_2$$

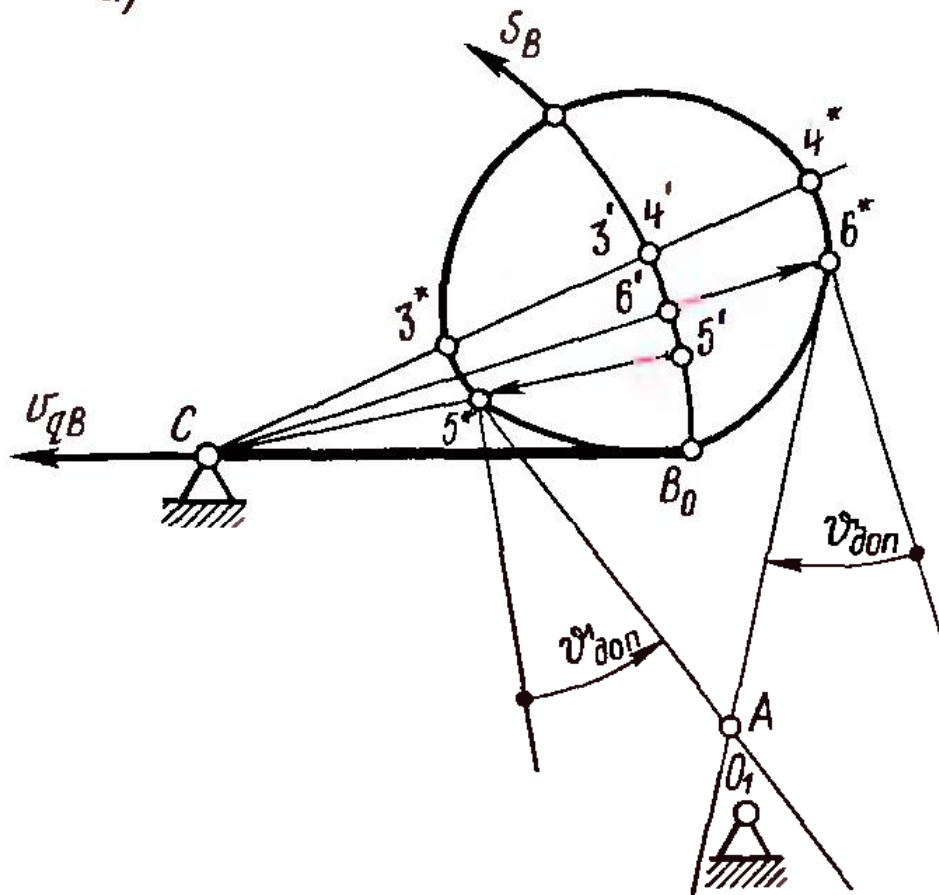
$$\left| \begin{array}{l} S_{(j=0)} = 0 \\ S_{(j=j_0)} = h \\ S'_{(j=0)} = 0 \end{array} \right| \left| \begin{array}{l} C_1 = ? \\ C_1 = ? \\ b_1 = ? \end{array} \right.$$



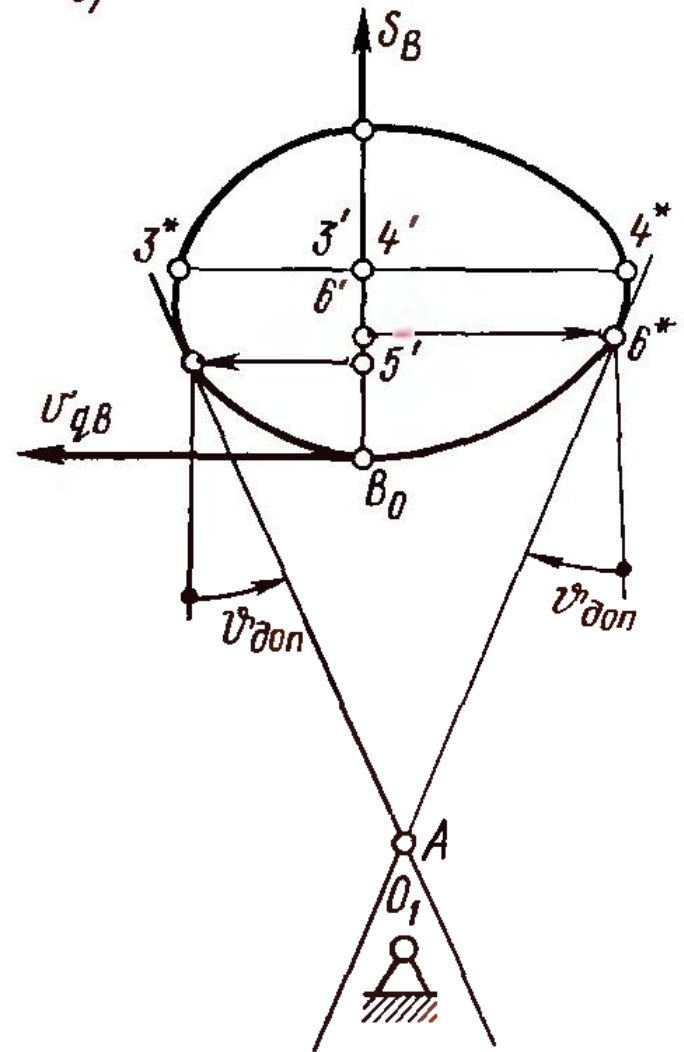


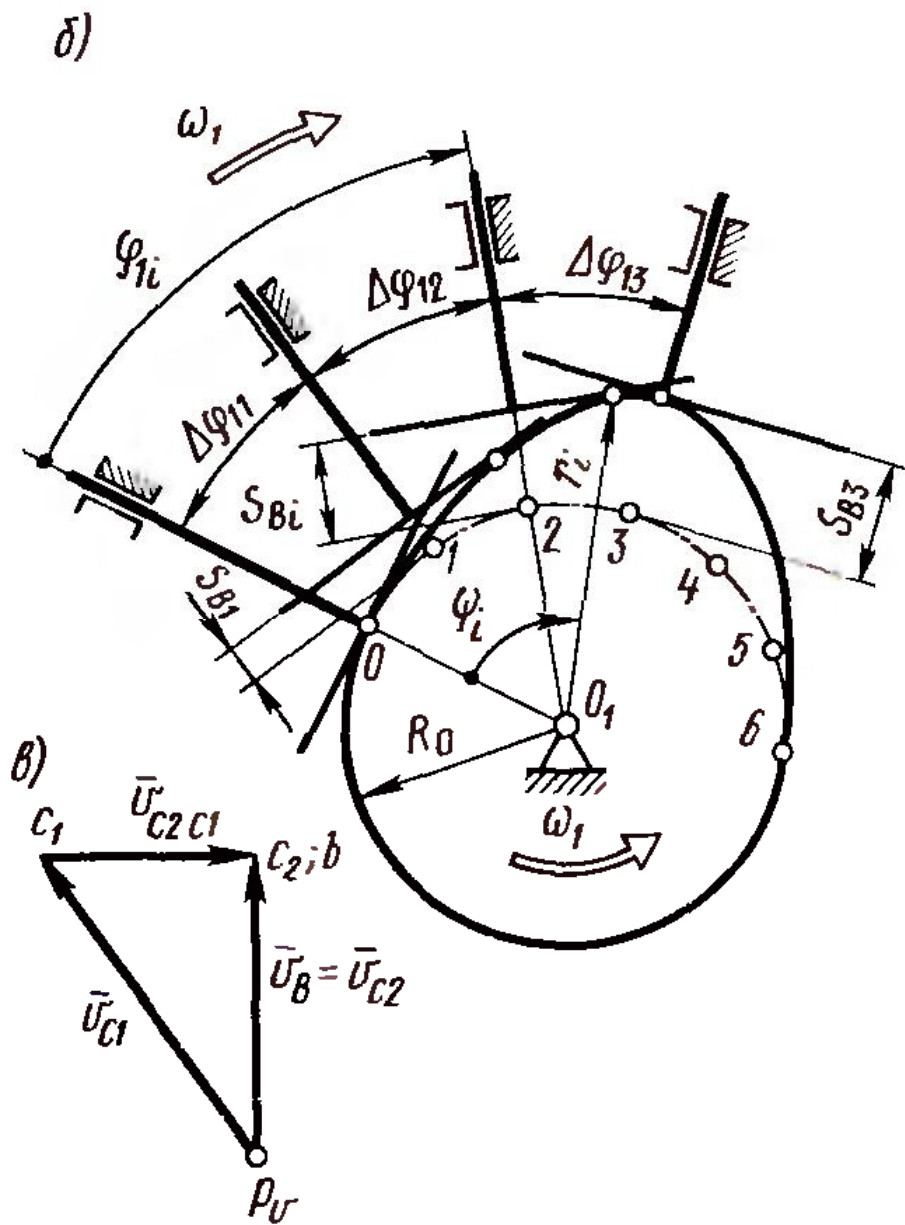
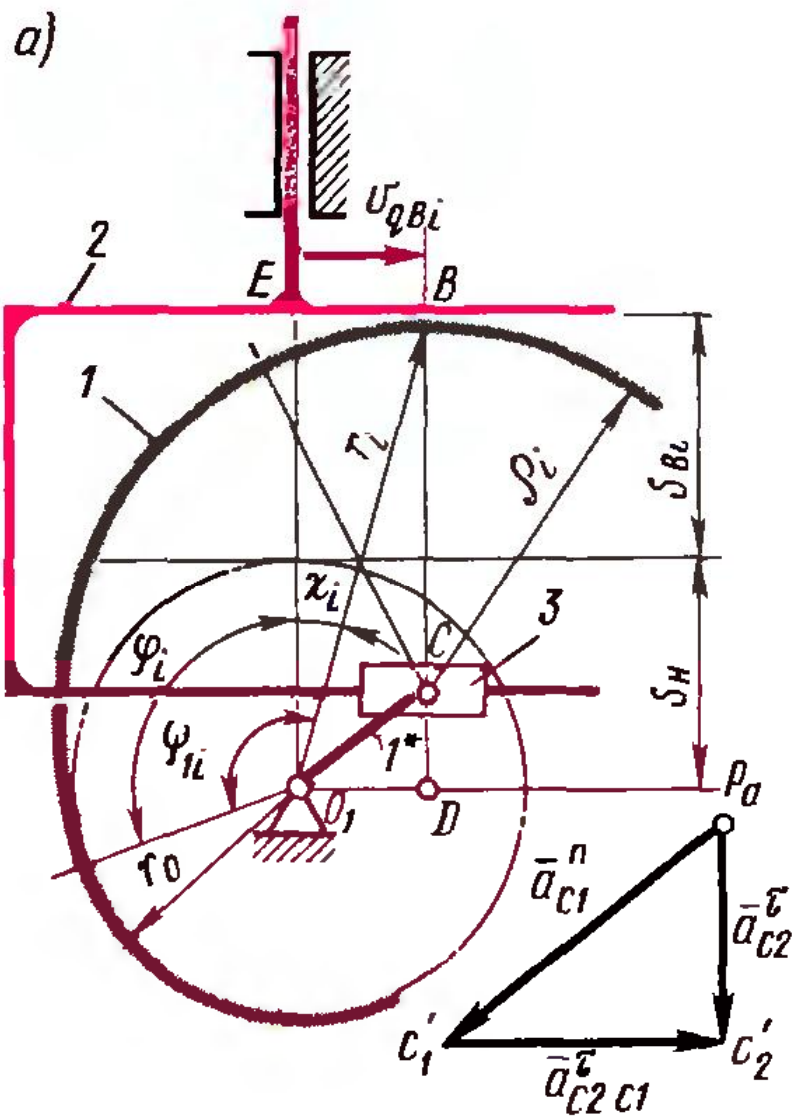


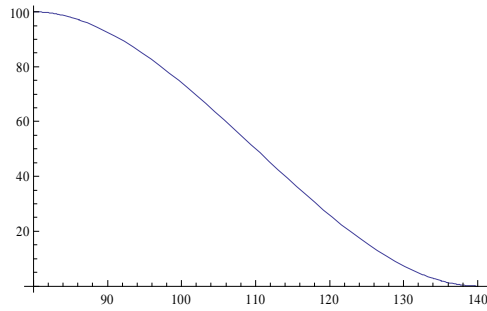
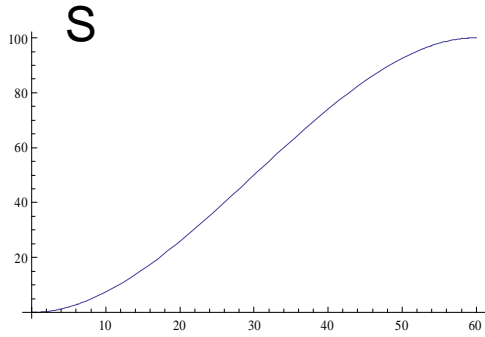
a)



б)



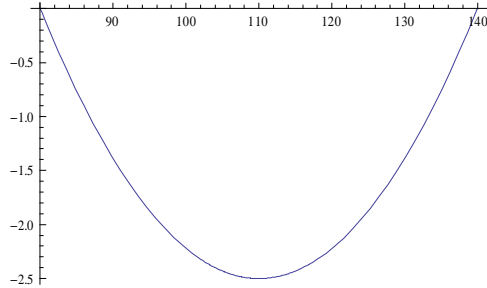
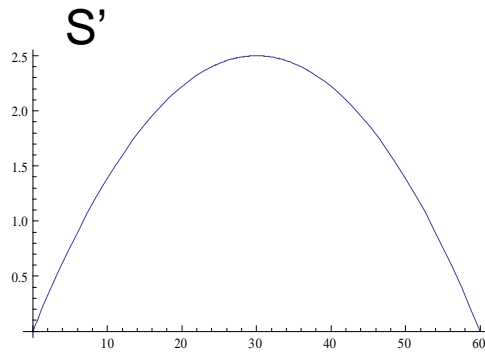




$$S'' = -\frac{2b_1}{j_o} x + b_1$$

$$S' = -\frac{2b_1}{j_o} x^2 + b_1 x + C_1$$

$$S = -\frac{2b_1}{3j_o} x^3 + \frac{b_1}{2} x^2 + C_1 x + C_2$$



$$S_{(x=0)} = 0 \Rightarrow C_2 = ?$$

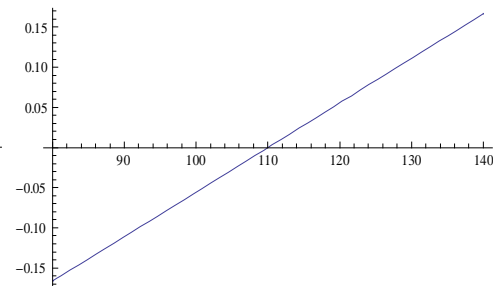
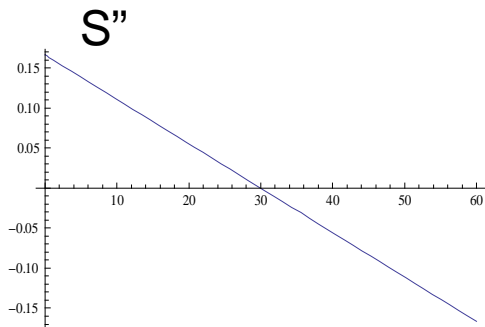
$$S'_{(x=0)} = 0 \Rightarrow C_1 = ?$$

$$S_{(x=j_o)} = h \Rightarrow b_1 = ?$$

$$S'' = \frac{2b_2}{j_{\Pi}} (x - x_{O\Pi} - x_o) - b_1$$

$$S' = \frac{2b_2}{j_{\Pi}} (x - x_{O\Pi} - x_o)^2 - b_2 (x - x_{O\Pi} - x_o) + C_3$$

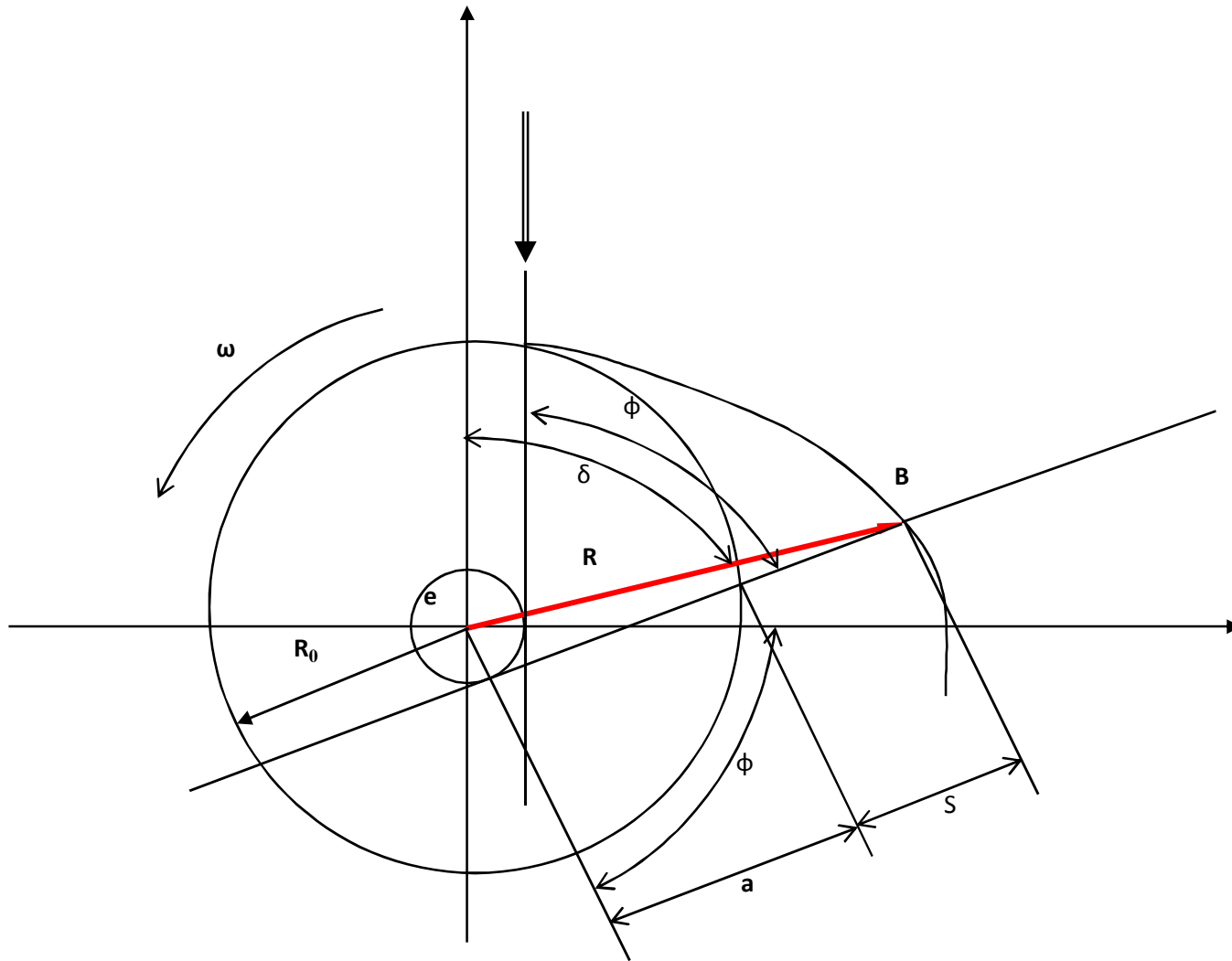
$$S = h + \frac{2b_2}{3j_{\Pi}} (x - x_{O\Pi} - x_o)^3 - \frac{b_2}{2} (x - x_{O\Pi} - x_o)^2 + C_3 (x - x_{O\Pi} - x_o) + C_4$$



$$S_{(x=j_{\Sigma})} = 0 \Rightarrow C_4 = ?$$

$$S'_{(x=j_{\Sigma})} = 0 \Rightarrow C_3 = ?$$

$$S_{(x=j_{\Sigma})} = h \Rightarrow b_2 = ?$$



$$R_i^2 = e^2 + (a + S_i)^2$$

$$x_B = e \cos j_i + (a + S_i) \sin j_i$$

$$y_B = -e \sin j_i + (a + S_i) \cos j_i$$

$$a = \sqrt{R_0^2 + e^2}$$

$$\operatorname{tg} q_{12} = \frac{S_i' - e}{a + S_i}$$

$$q_{12} = \operatorname{arctg} \left(\frac{S_i' - e}{a + S_i} \right)$$

$$R_i = \sqrt{x_B^2 + y_B^2} = \sqrt{e^2 + (a + S_i)^2}$$

$$d_i = \operatorname{arctg} \frac{x_B}{y_B} = \operatorname{arctg} \frac{(a + S_i) \sin j_i + e \cos j_i}{(a + S_i) \cos j_i - e \sin j_i}$$

$$R_0 = \frac{\sqrt{e^2 - 2eS' + (S')^2 + 2eSTgq_{12} - 2eS S'Tgq_{12} + e^2Tg^2q_{12} + S^2Tg^2q_{12}}}{Tgq_{12}}$$

$$S = \frac{h}{2} ; S' = S'_{\max} ; q_{12} = q_{12}^{\text{Доп}}$$

$$R_0 = \frac{\sqrt{(S')^2 + S^2Tg^2q_{12}}}{Tgq_{12}}$$

$$S = \frac{h}{2} ; S' = S'_{\max} ; q_{12} = q_{12}^{\text{Доп}}$$

