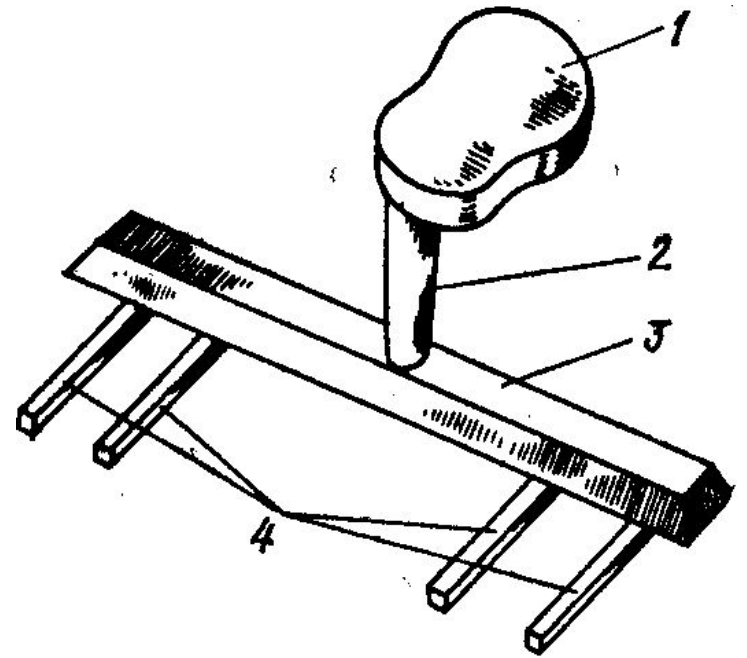
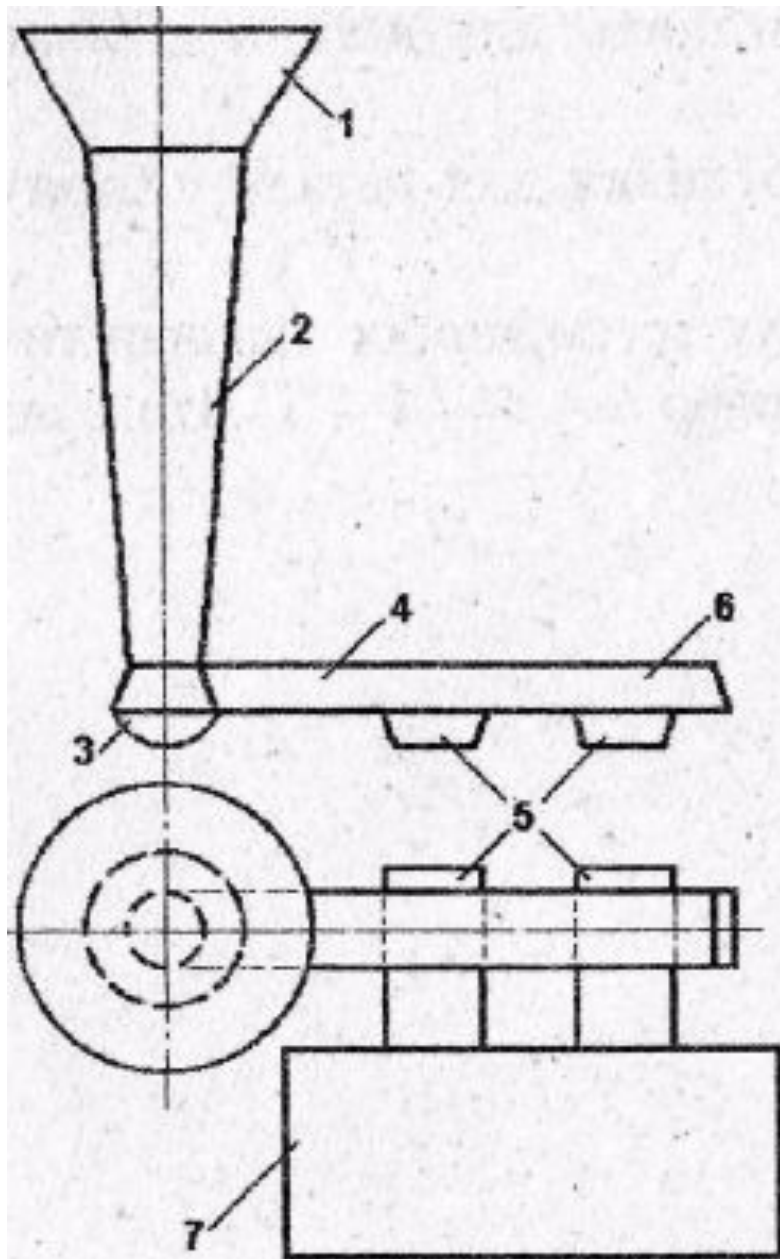
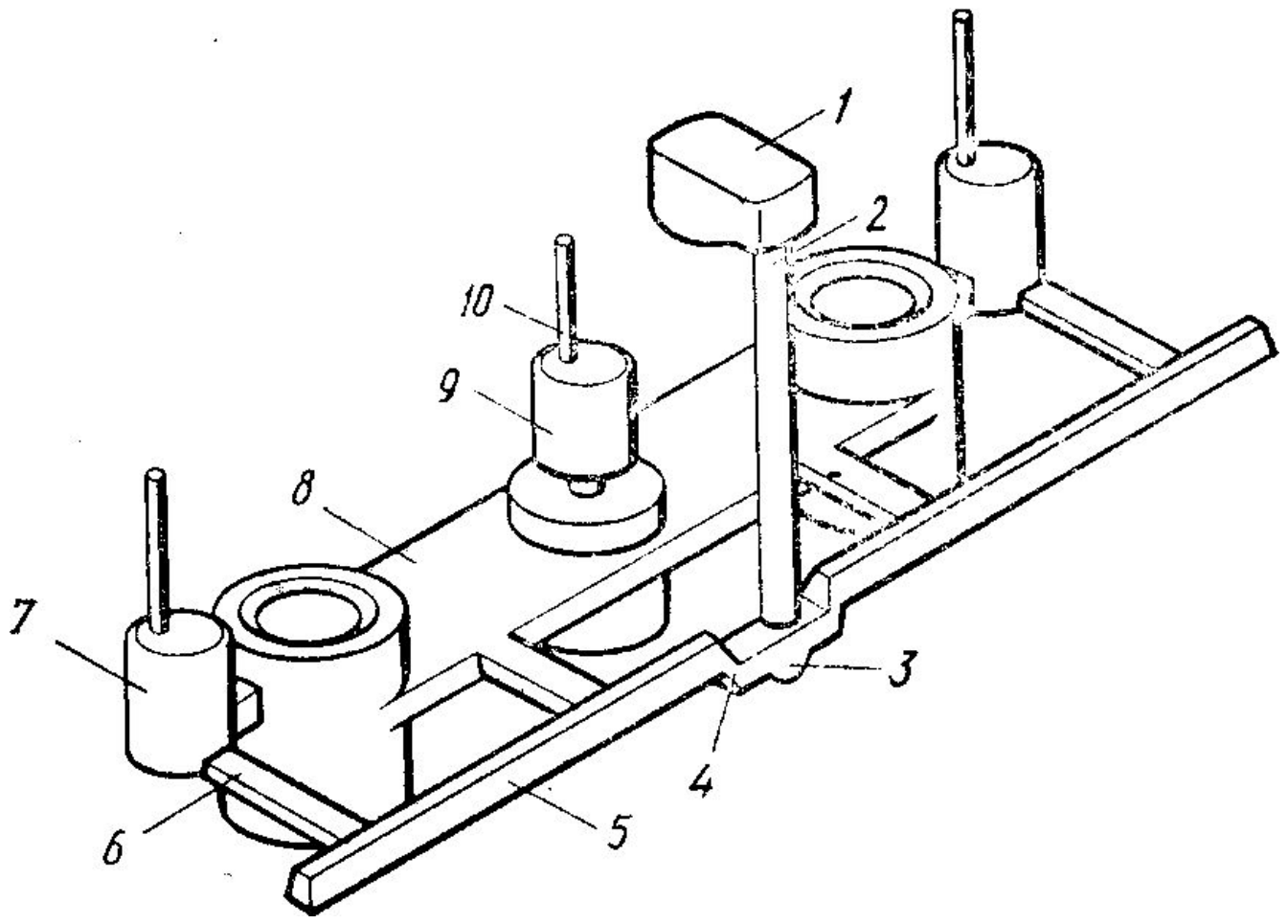
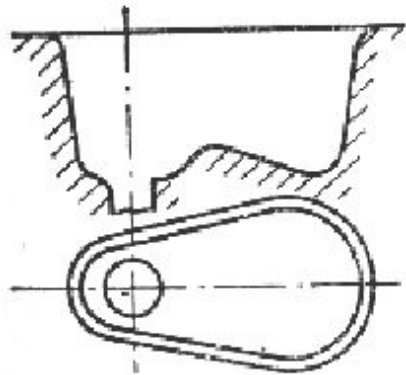


# **Литниковая система**

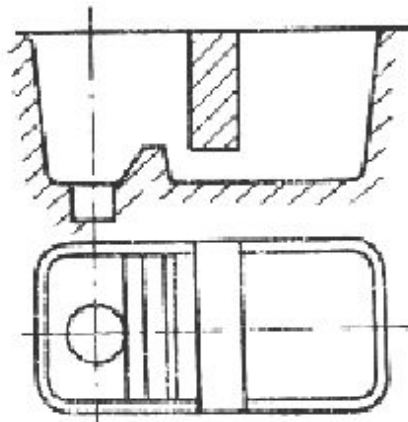




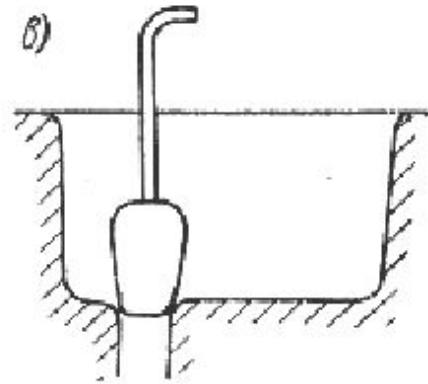
a)



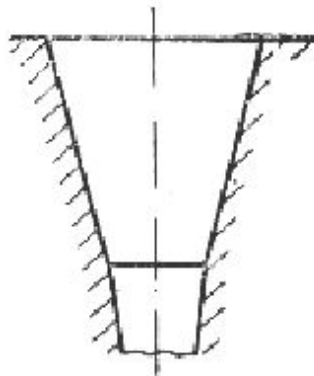
b)



в)



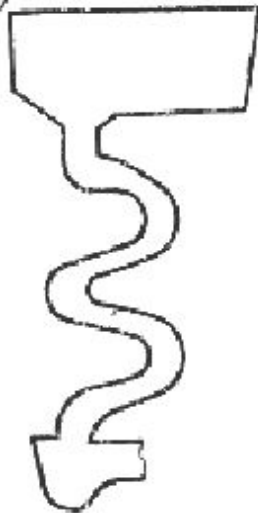
г)



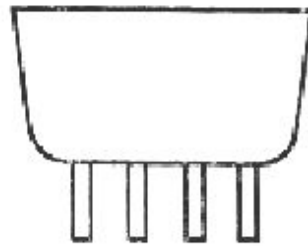
д)



е)

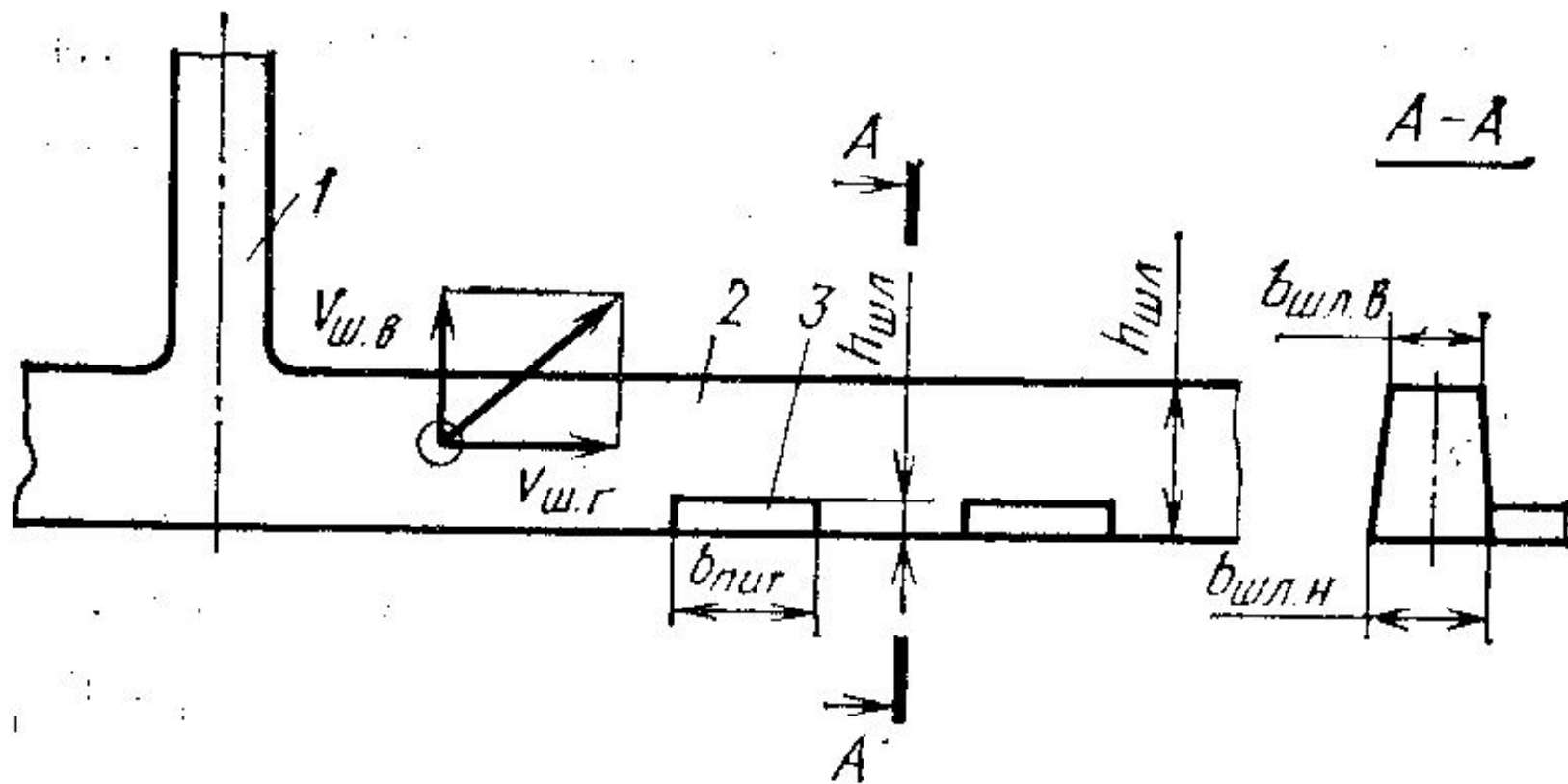


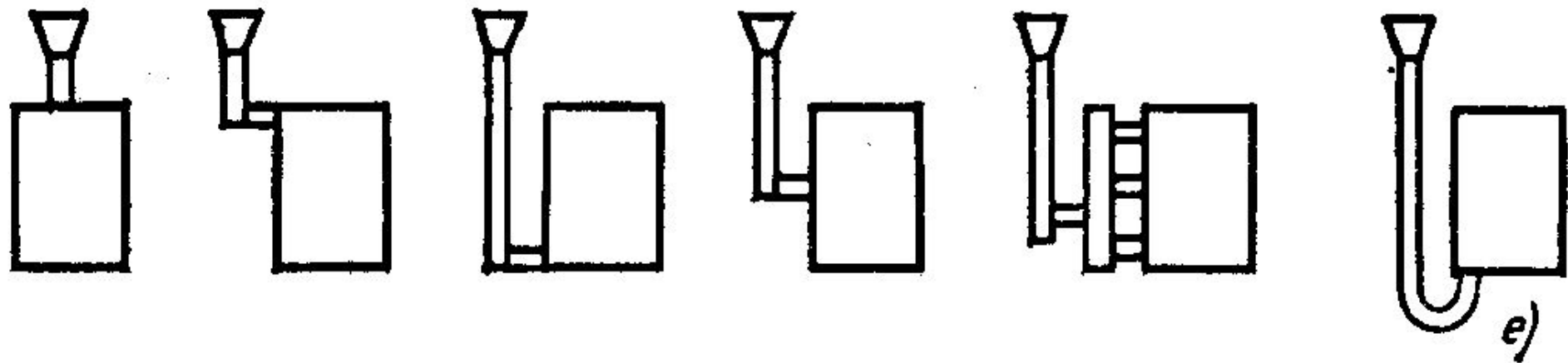
ж)

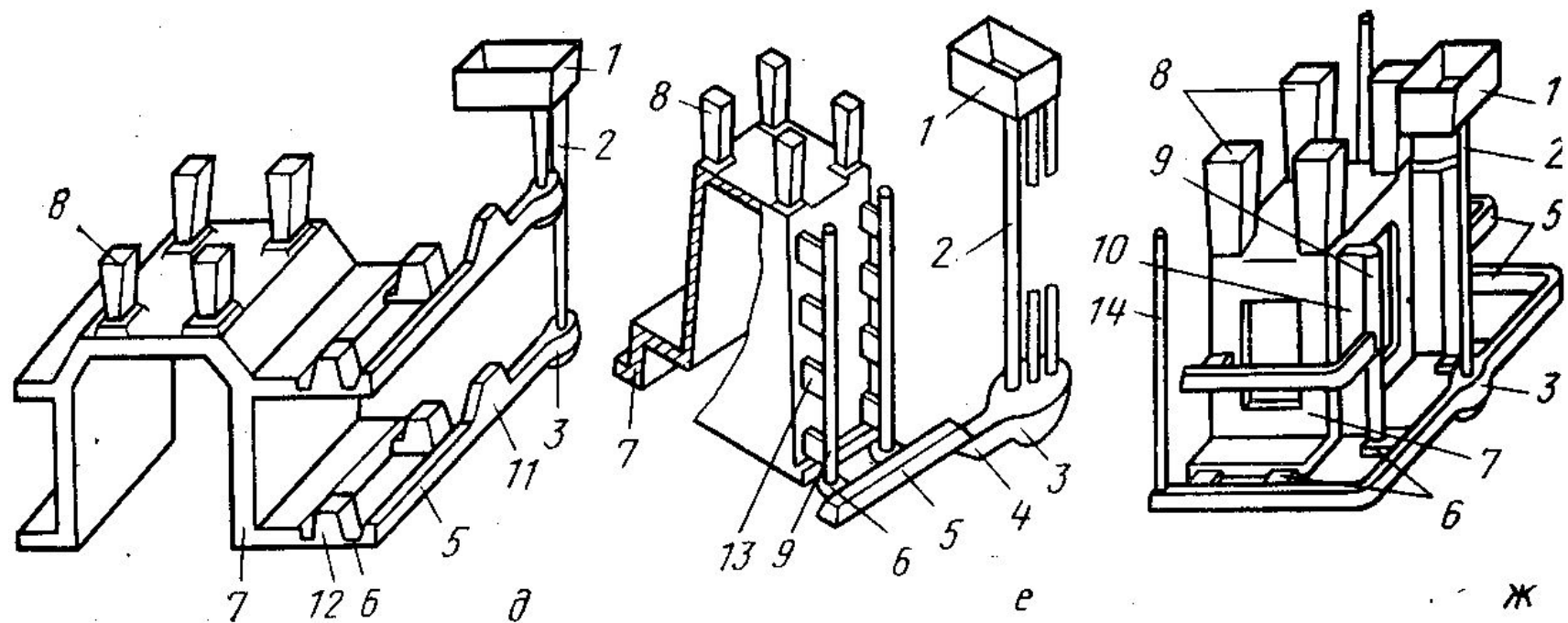
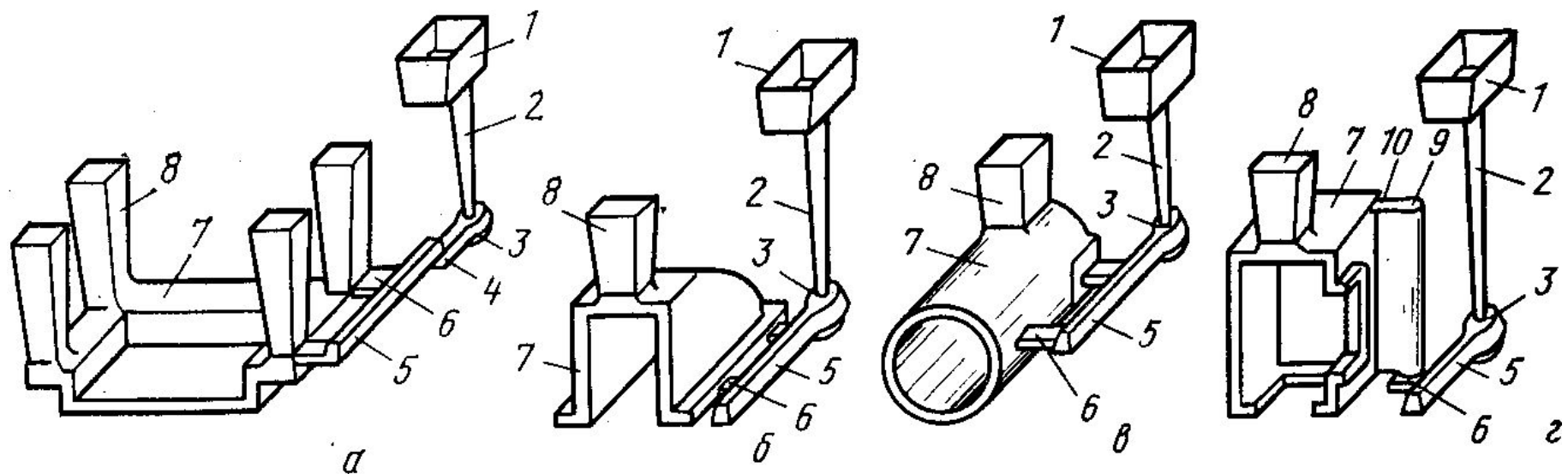


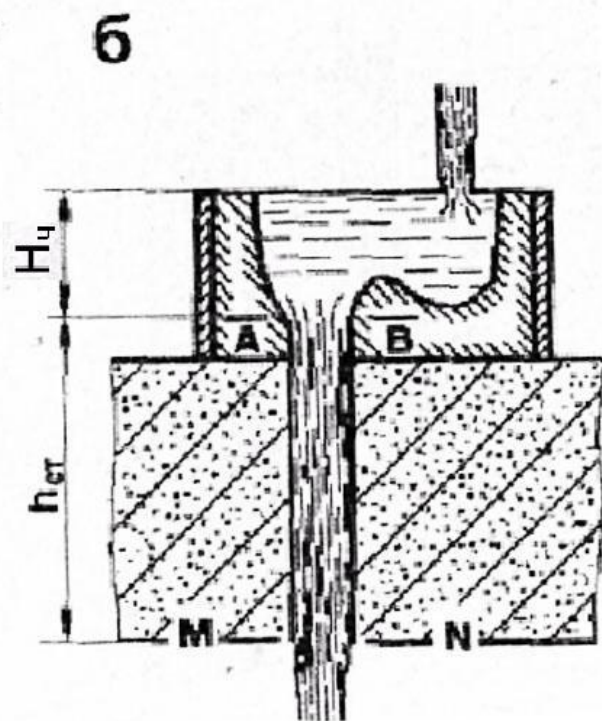
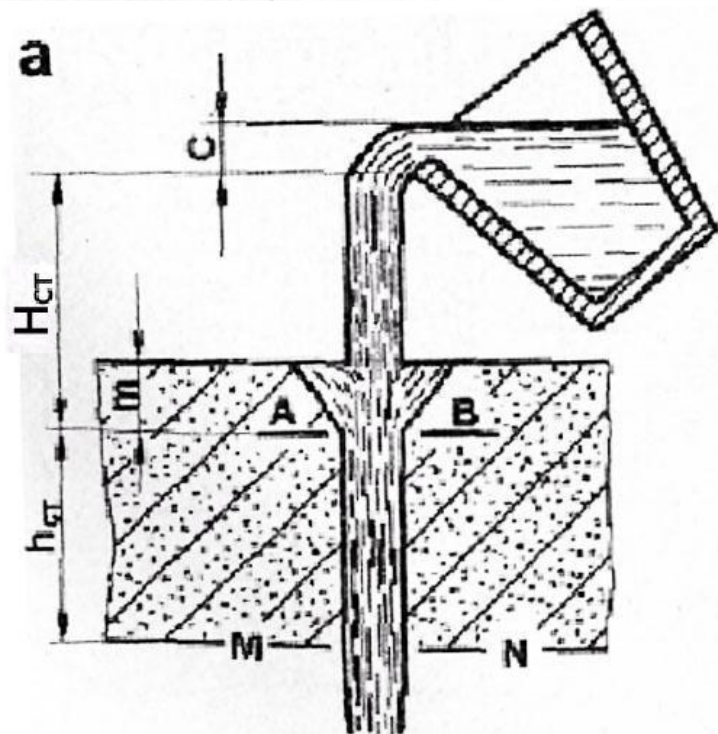
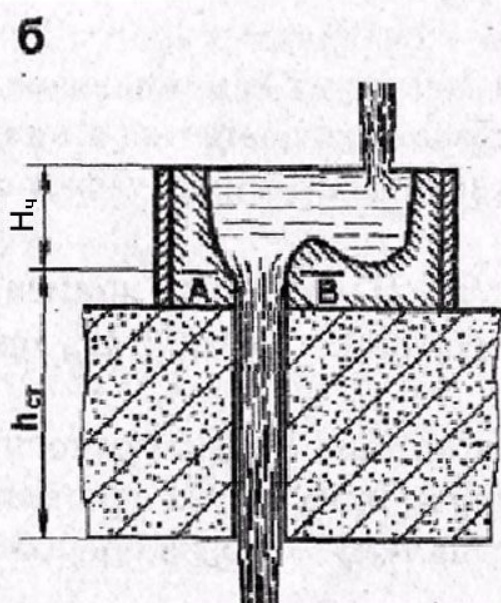
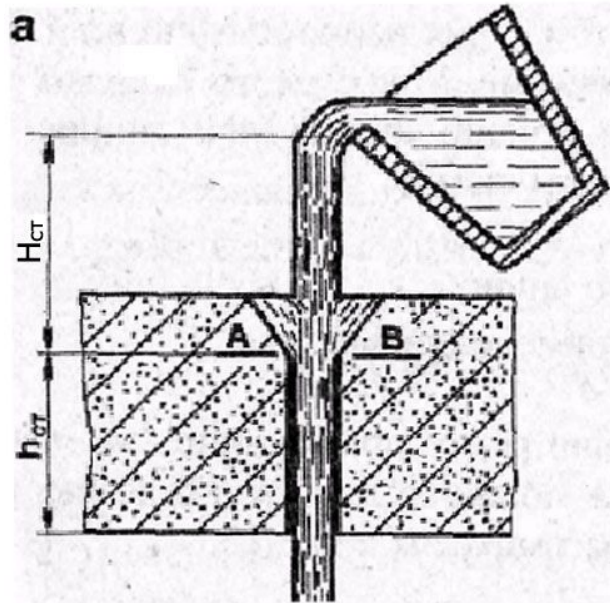
з)









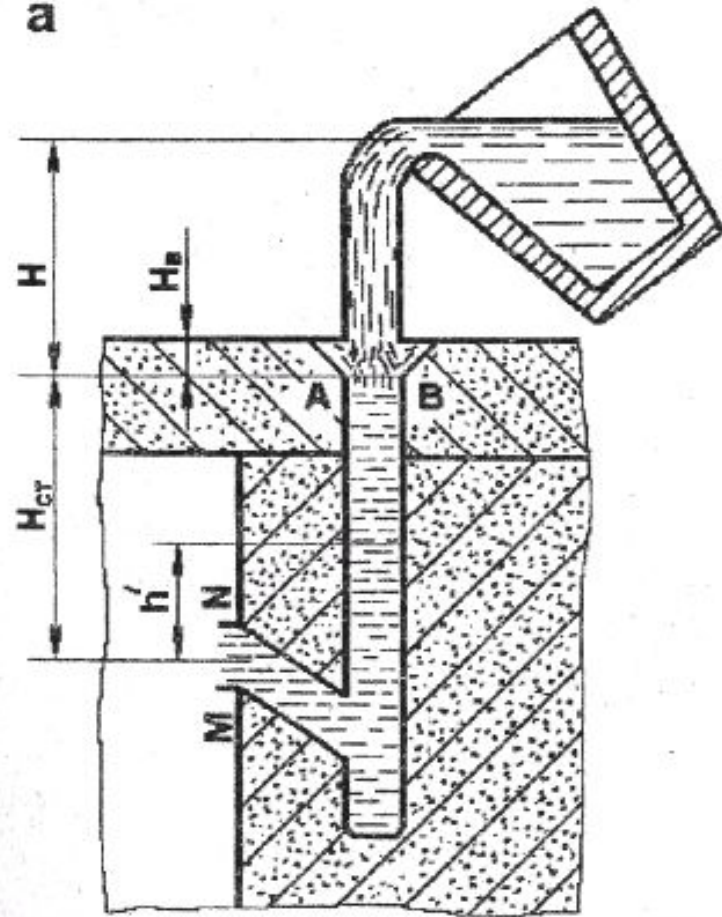
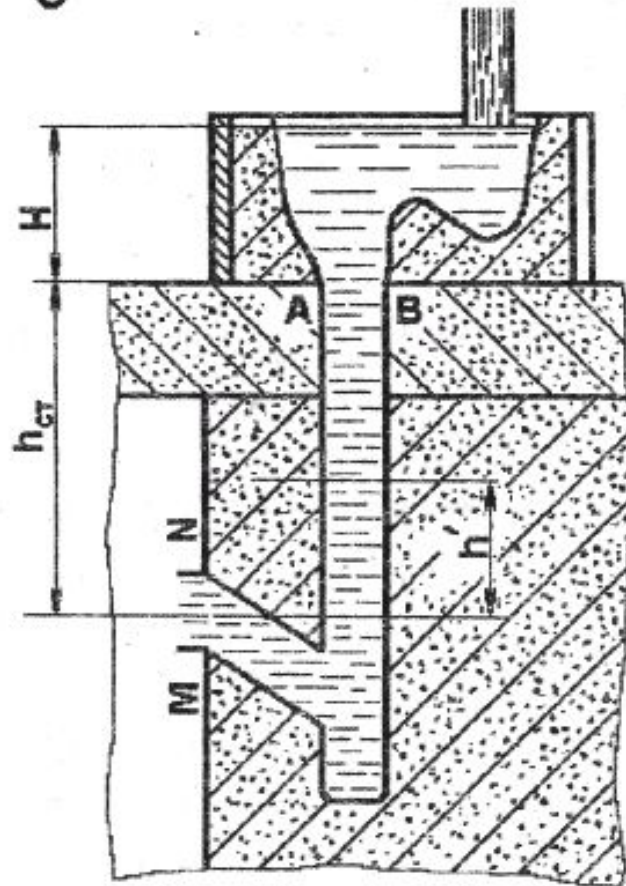




$$H_p = (1,3 - 1,4)H_B$$

$$H_p = H_q + h_{CT}$$

$$H_p = (1,3 - 1,4)H_B + h_{CT}$$

**a****б**

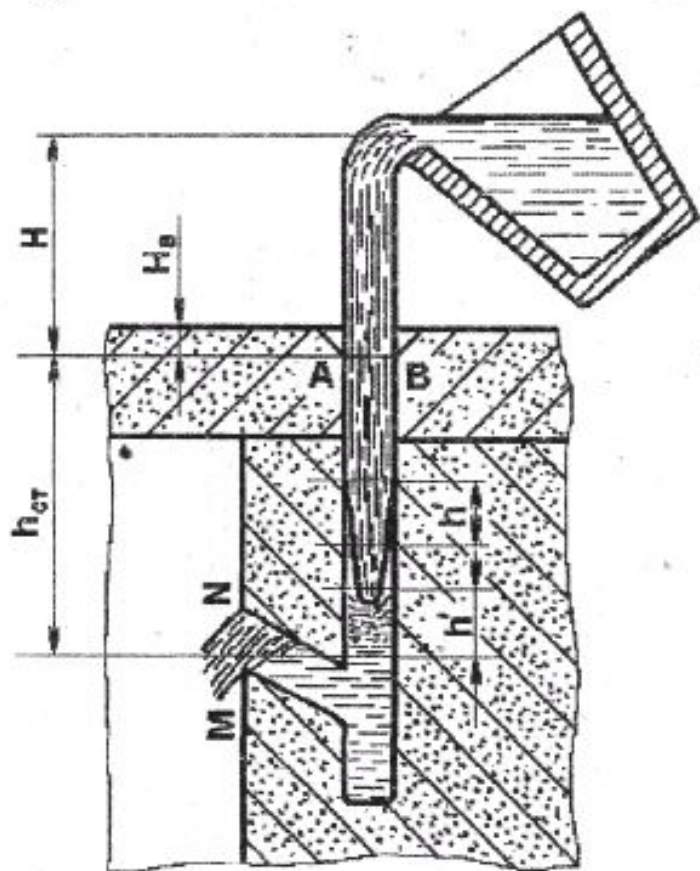
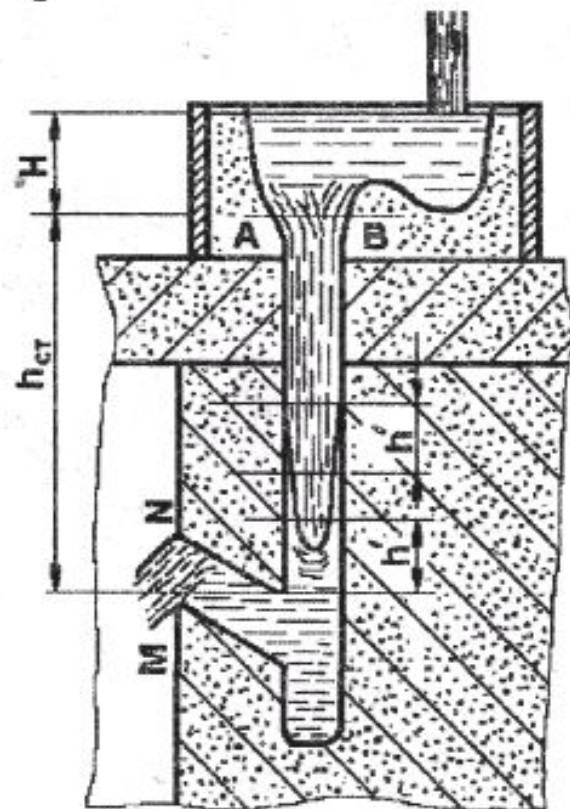
$$Q_a = \mu_1 \cdot f_{AB} \cdot \sqrt{2gH}$$

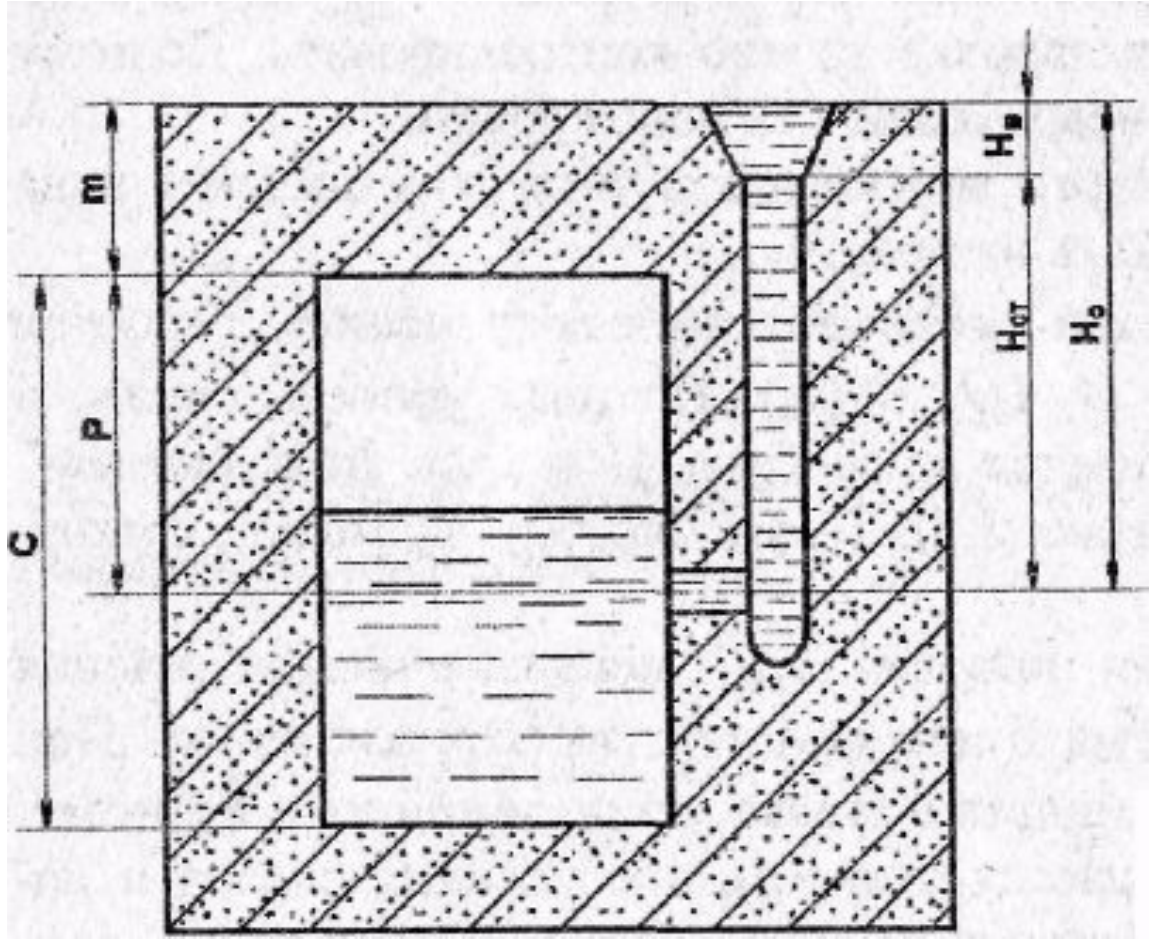
$$Q_e = \mu_2 \cdot f_{MN} \cdot \sqrt{2gh'}$$

$$Q_e = \mu_2 \cdot f_{\text{CT.H}} \cdot \sqrt{2gh'}$$

$$h'_y = \frac{\mu_1^2}{\mu_2^2} \frac{f_{AB}^2}{f_{MN}^2} \cdot H$$

$$h'_y = \frac{\mu_1^2}{\mu_2^2} \frac{f_{AB}^2}{f_{cm.H}^2} \cdot H$$

**a****б**



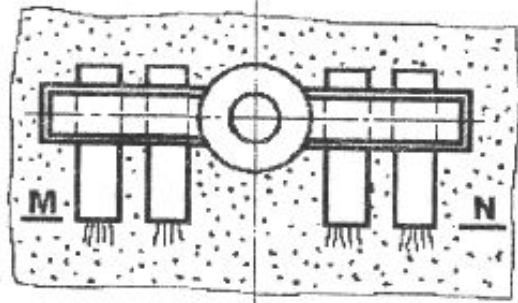
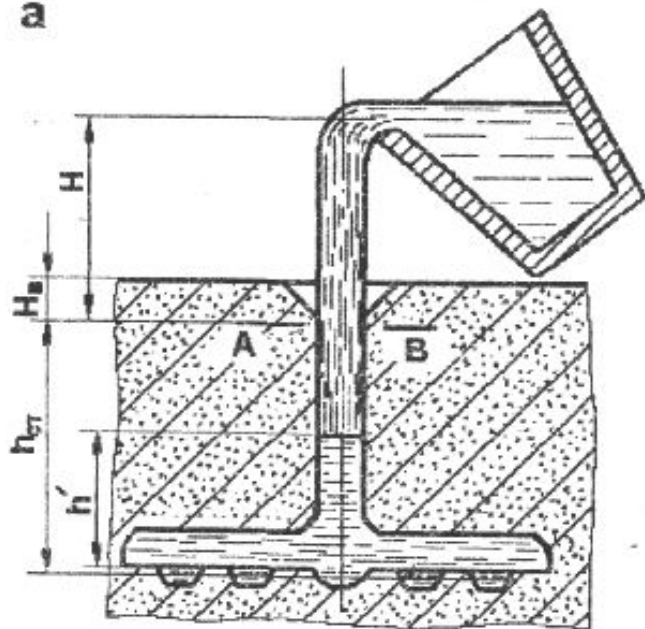
$$H_p = H_o - \frac{P^2}{2C}$$

$$H_o = H_{cm} + (1,3 \div 1,4)H_p$$

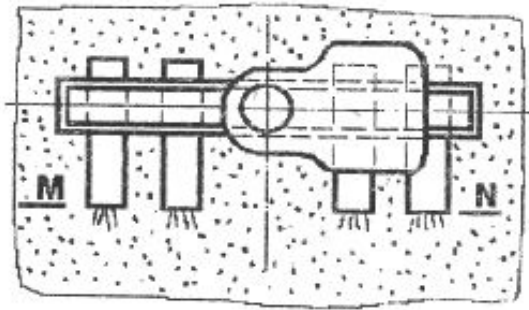
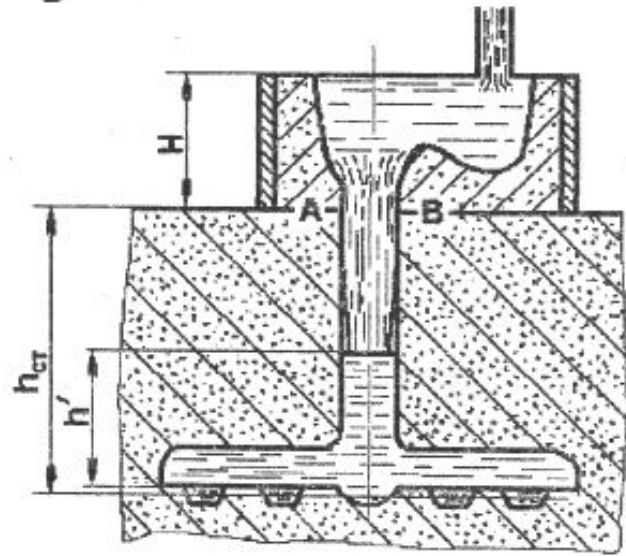
$$H_o = H_{cm} + H_u$$

$$f_{MN} = f_{AB} \frac{\mu_1 \sqrt{H_u}}{\mu_2 \sqrt{h'_{ycm}}}$$

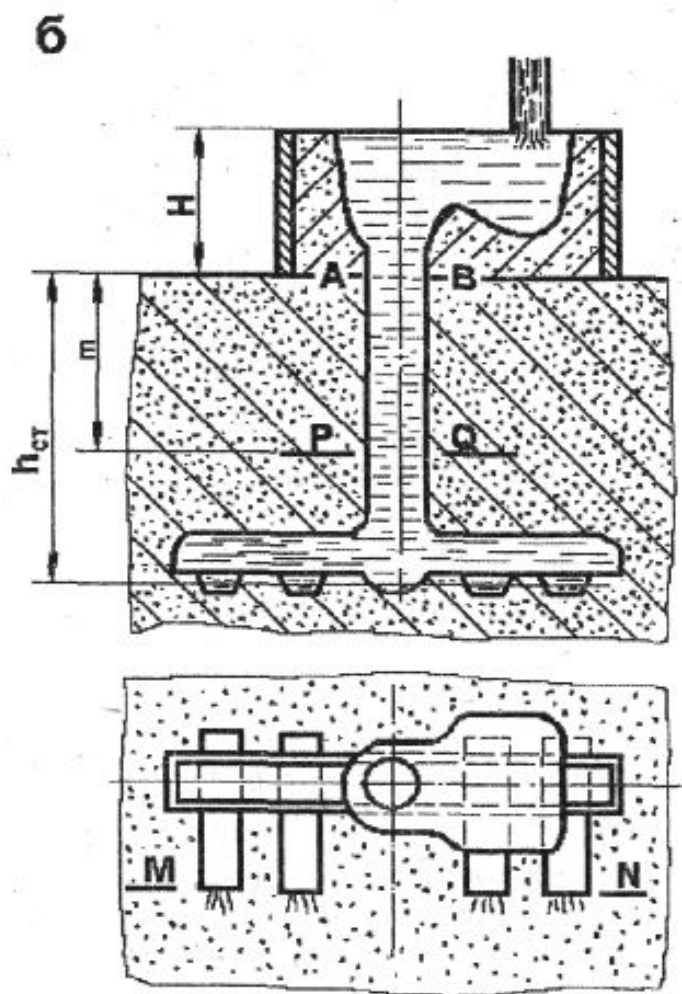
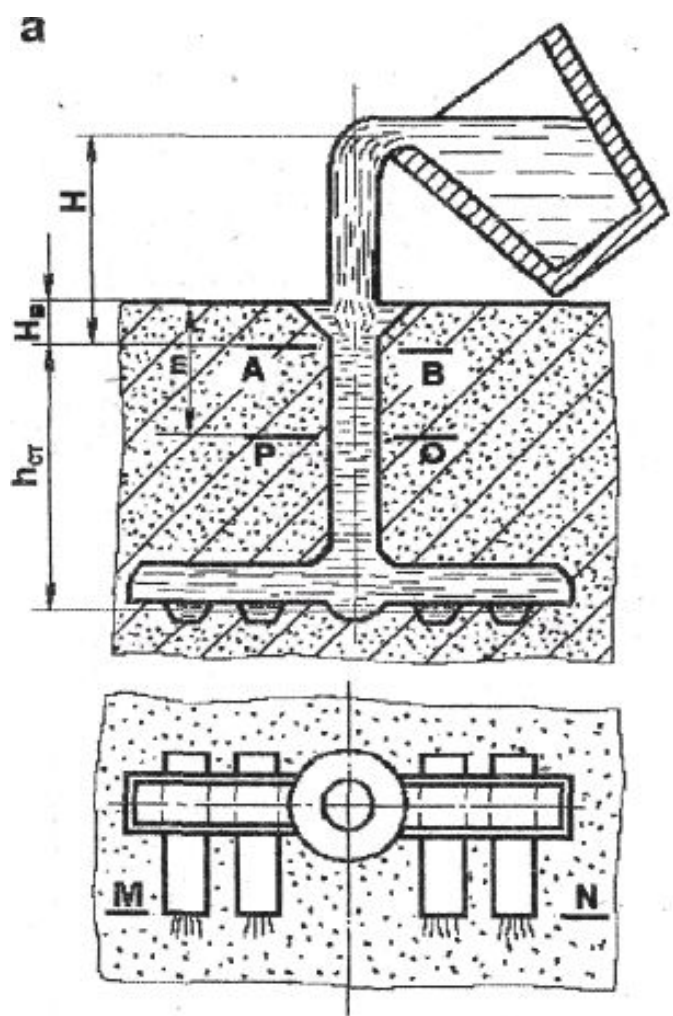
а

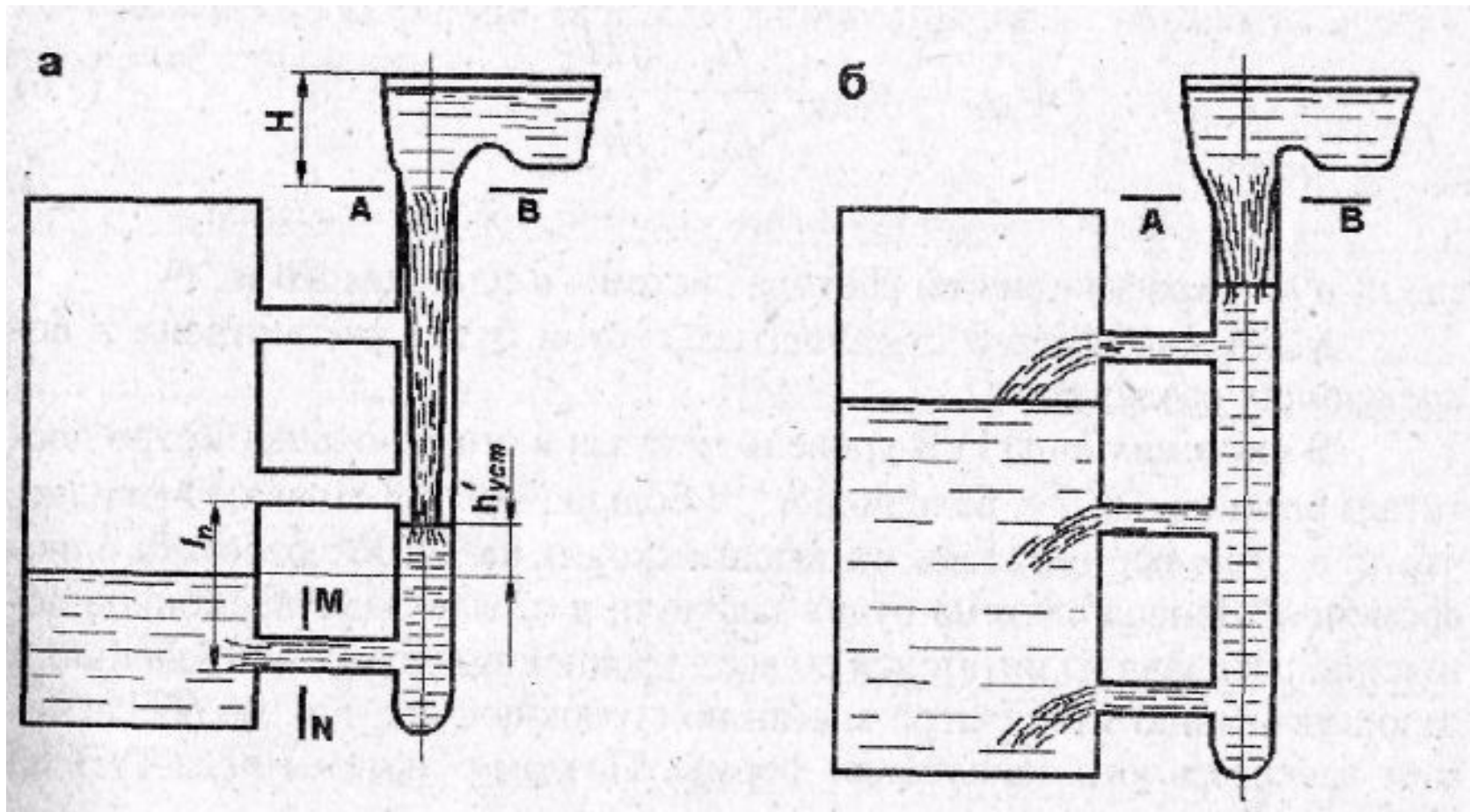


б









$$T_{\min} < T_{\text{зал}} < T_{\max}$$

$$T = A \delta^m G^n$$

$$T_{\text{опт}} = \sqrt[3]{\delta \cdot G}$$

$S_1$

Сплав	A	m	n
чугун	1.63-2.2	0	0.5
чугун*	2	0.334	0.33
сталь**	1.5	0.334	0.33
алюминиевые сплавы**	1.7-3.0	0.334	0.33
магниевые сплавы**	2.3-4.5	0.334	0.33

Сплавы	Литниковая система			
	горизонтальная		вертикальная	
	ПГС	кокиль	ПГС	кокиль
Чугун	2,0	3,4	-	3,9
Сталь углеродистая	0,9-1,75	-	-	-
Сталь легированная	0,4-0,8	-	-	-
Алюминиевые	1,9-2,5	2,3-2,7	2,7-3,0	3,3-4,0
Магниевые	2,4-2,8	2,5-2,9	3,0-4,3	3,7-4,2
медные	1,9-2,1	-	-	-

$$G_{\text{ж}} = N \cdot (G_{\text{отл}} + G_{\text{приб}}) + G_{\text{л.с}}$$

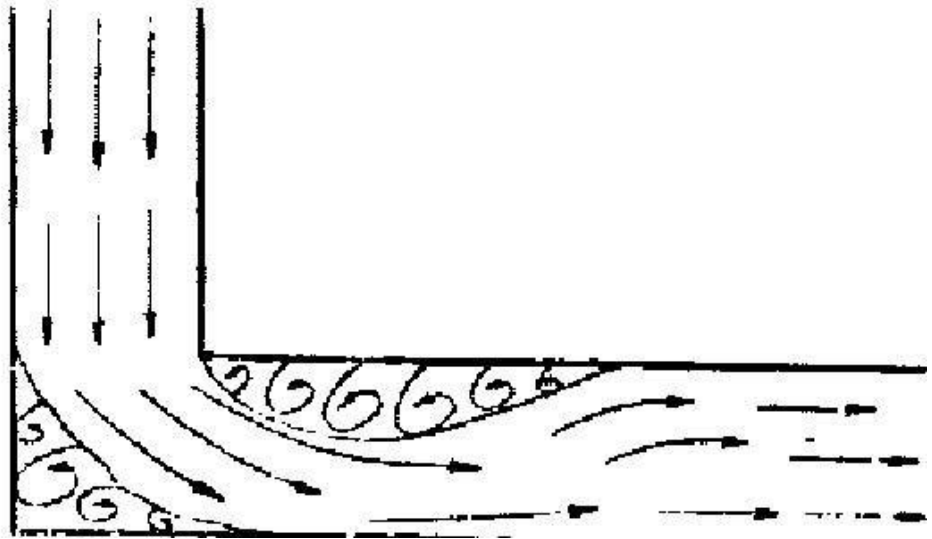
$$V_{\text{ср}} = h_{\text{отл}} / \tau_{\text{опт}}$$

$$T_{\text{опт}} = \sqrt[3]{\delta G}$$

$$f_{\text{уз}} = \frac{G_{\text{жс}}}{\rho_{\text{жс}} \cdot \mu \cdot \tau_{\text{опт}} \sqrt{2gH_p}}$$

$$F_{\text{num}} = \frac{G}{\mu\tau \cdot 0,31\sqrt{H_{cp}}}$$

$$\mu = \frac{1}{\sqrt{1 + \sum \xi_i}}$$



Угол поворота, °	30	60	90	120
$\xi_{\text{пов}}$	0,20	0,55	1,10	1,40



Соотношение площадей сечений элементов	0,2	0,4	0,6	0,8	1,0
$\xi_{\text{сеч}}$	0,42	0,34	0,25	0,15	0

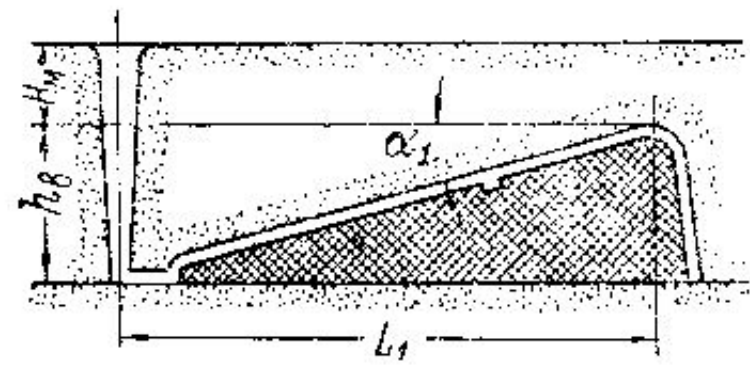
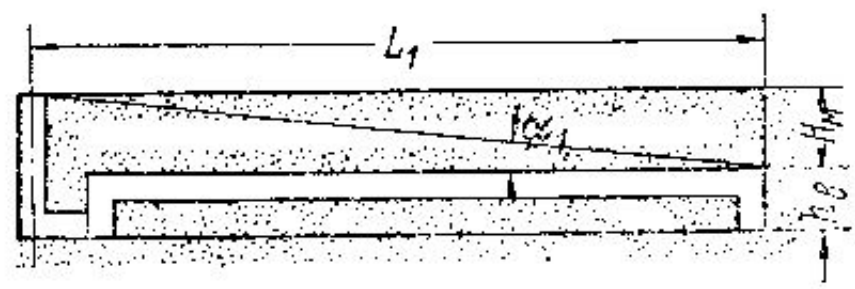
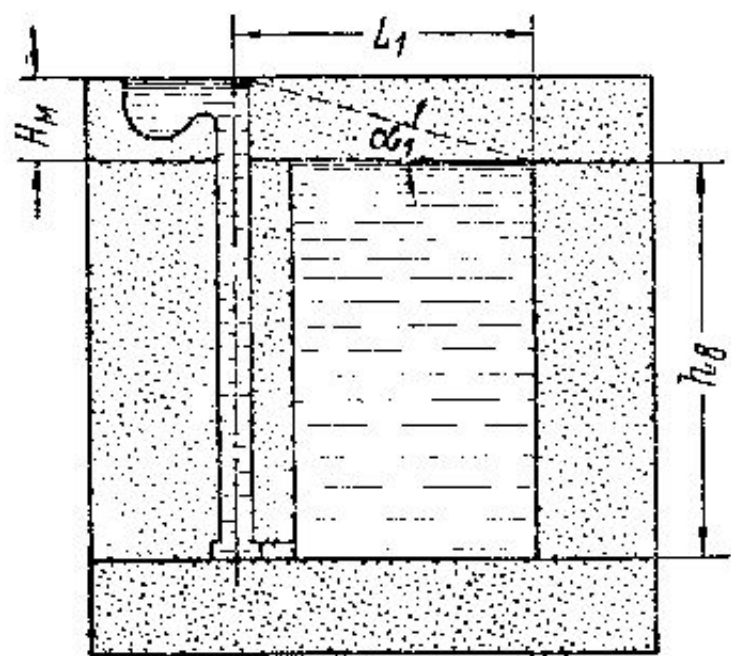
$$\xi_{mp} = \lambda \frac{L}{D} \quad \lambda = \frac{64}{\text{Re}}$$

$$\xi_{mp} = \frac{4}{\text{Re}} \frac{L}{D}$$

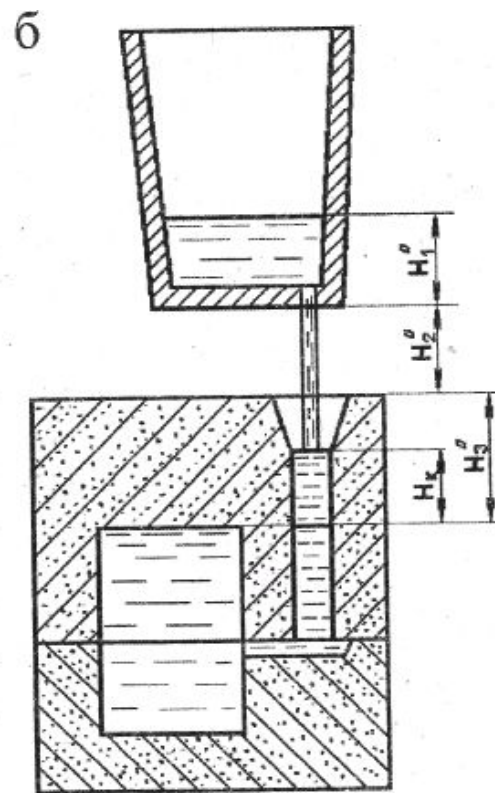
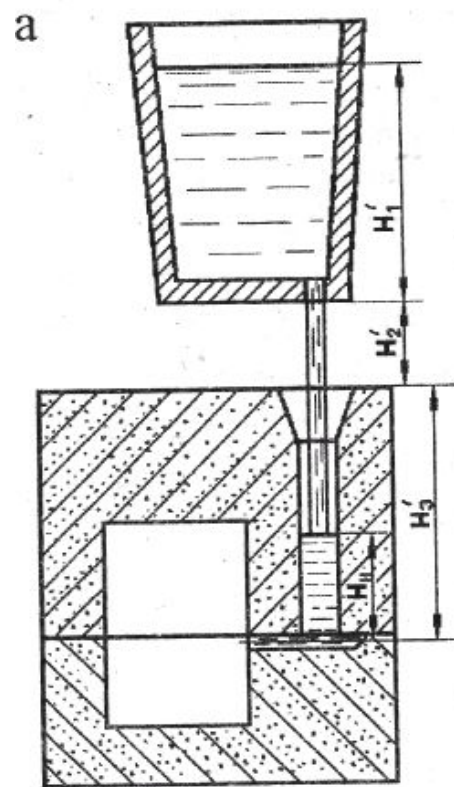
$$\mu = \frac{1}{\sqrt{1,5 + 1,1n + 0,15m + 0,04 \sum \frac{L}{D}}}$$

Сплав и способ заливки	Сопротивление формы $\mu$		
	большое	среднее	малое
Чугун:			
заливка в сырую форму	0,35	0,42	0,50
заливка в сухую форму	0,41	0,48	0,70
Сталь:			
заливка в сырую форму	0,25	0,32	0,42
заливка в сухую форму	0,30	0,38	0,50

Фактор, влияющий на величину коэффициента	Поправка к значению
Повышение температуры заливки на 50 °С	До $\pm 0,05$
Наличие открытых выпоров и прибылей	От + 0,05 до + 0,20
Большое сечение стояка и шлакоуловителя по сравнению с сечением питателей	От + 0,05 до + 0,20
Малая газопроницаемость формы (отсутствие выпоров и прибылей)	До -0,05



материал	Тип ковша	$f_{ст} : f_{шл} : f_{лит}$
чугун и сталь	поворотный ковш	$(1,15 : 1,05 : 1,0) \div (1,6 : 1,3 : 1,0),$
углеродистая сталь	стопорный ковш	$1,3 : 1,15 : 1$
крупные отливки литниковая система из огнеупорных трубок	стопорный ковш	$1 : 1 : 1$ (или л.с. – расширяющаяся)
высоколегированной стали		$1 : (1,33 \div 2) : (1,33 \div 2)$
ковкого чугуна		$1 : (1,31 \div 1,5) : (1,33 \div 2)$
для отливок из латуни ЛЦ40С		$1,6:1,3:1$



$$\sqrt{H_{cp}} = \frac{\sqrt{H_1'} + \sqrt{H_1''}}{2}$$

$$Q_k = \mu_k \cdot \beta_p f_o \sqrt{2gH_{cp}}$$

$$\frac{G_{жс}}{\rho \cdot \tau_{зал}} = \mu_k \cdot \beta_p f_o \cdot \sqrt{2gH_{cp}}$$

$$\frac{G_{жс}}{\rho} = \sqrt{2gH_{ср}} \frac{\pi \cdot D_{к}^2}{4} \cdot (H_1' - H_1''),$$

$$\tau = c\sqrt{G}$$

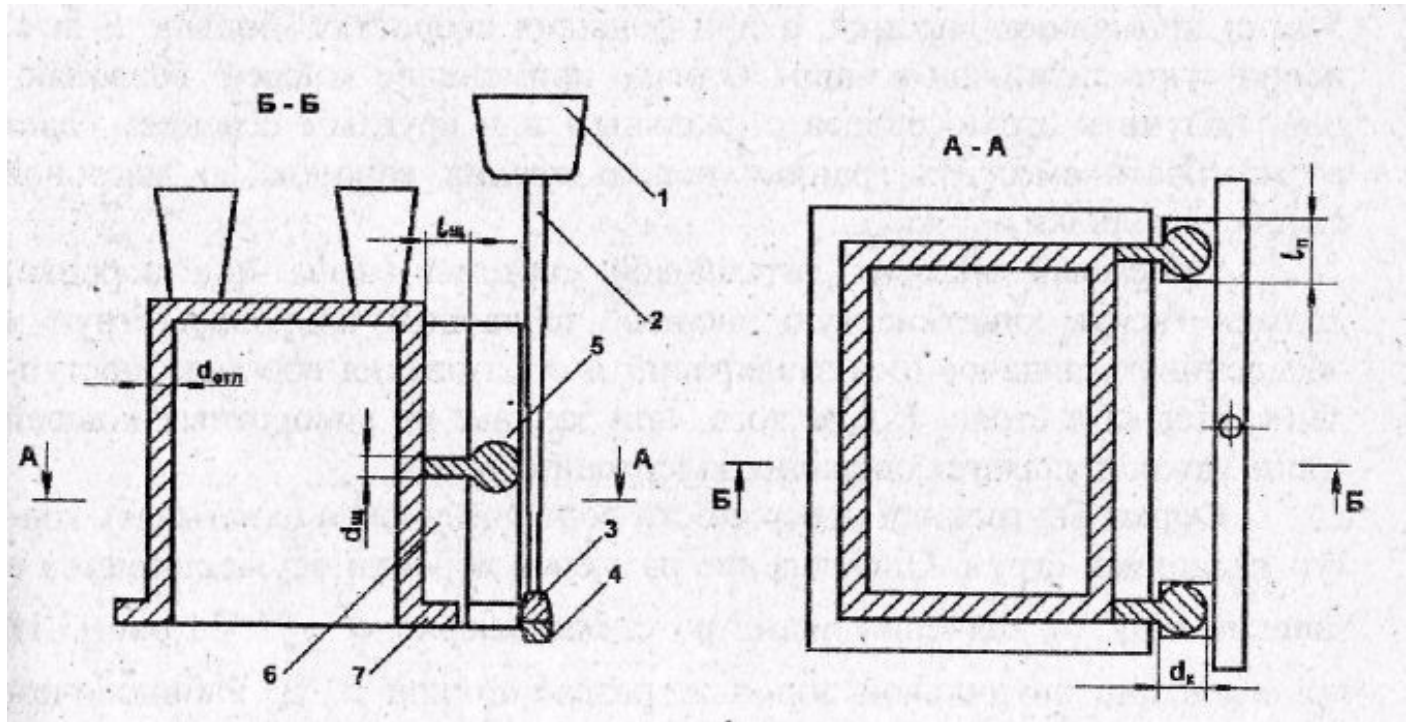
<i>Относительная плотность отливки</i>	<i>0—1,0</i>	<i>1,0—2,0</i>	<i>2,0—3,0</i>	<i>3,0—4,0</i>	<i>4,0—5,0</i>	<i>5,0—6,0</i>	<i>Свыше 6,0</i>
<i>Коэффициент С</i>	<i>0,8</i>	<i>0,9</i>	<i>1,0</i>	<i>1,1</i>	<i>1,2</i>	<i>1,3</i>	<i>1,4</i>



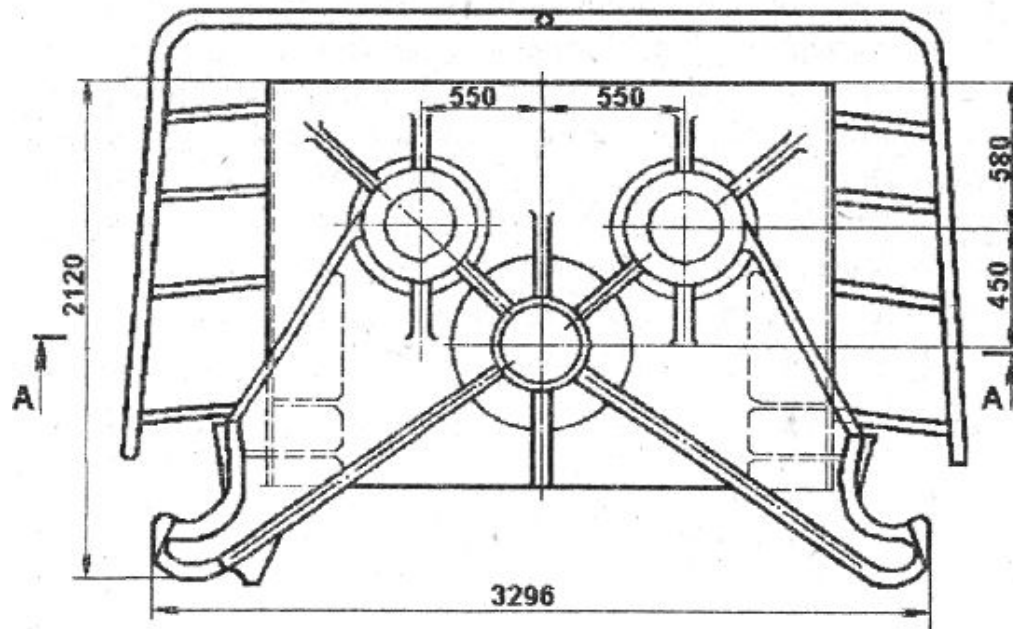
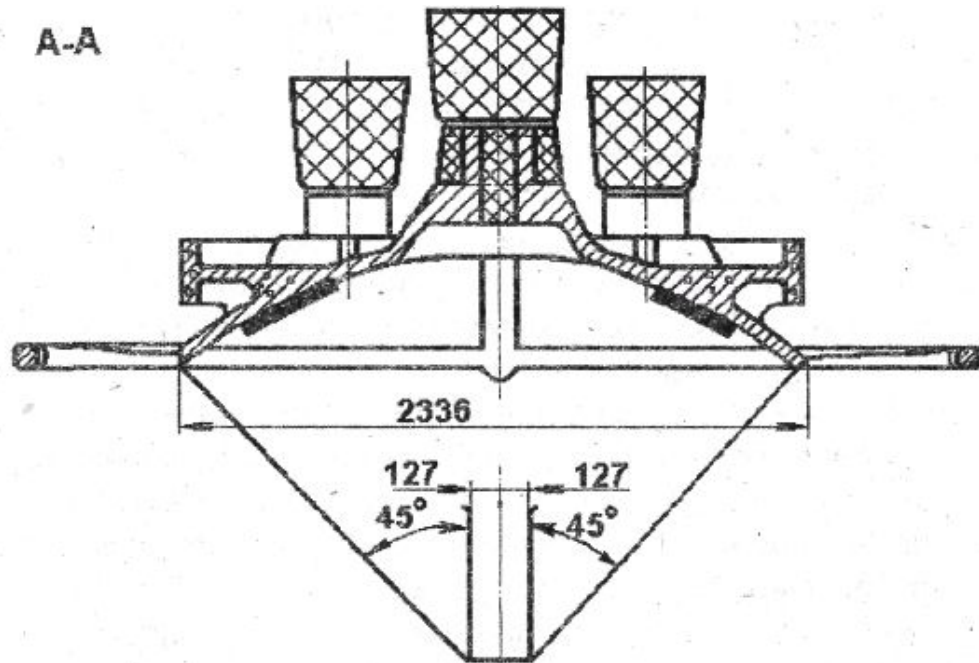
$$F_{\text{лит}} = \frac{G}{K_y \tau L}$$

$K_v$	<i>Масса отливки, кг</i>				
	<i>100</i>	<i>500</i>	<i>1000</i>	<i>5000</i>	<i>50000</i>
<i>1</i>	<i>0,30</i>	<i>0,44</i>	<i>0,60</i>	<i>0,65</i>	<i>0,70</i>
<i>2</i>	<i>0,60</i>	<i>0,65</i>	<i>0,70</i>	<i>0,75</i>	<i>0,80</i>
<i>3</i>	<i>0,65</i>	<i>0,70</i>	<i>0,75</i>	<i>0,81</i>	<i>0,90</i>
<i>4</i>	<i>0,70</i>	<i>0,75</i>	<i>0,82</i>	<i>0,90</i>	<i>1,00</i>
<i>5</i>	<i>0,75</i>	<i>0,82</i>	<i>0,93</i>	<i>1,00</i>	<i>1,15</i>
<i>6</i>	<i>0,80</i>	<i>0,90</i>	<i>1,00</i>	<i>1,15</i>	<i>1,20</i>

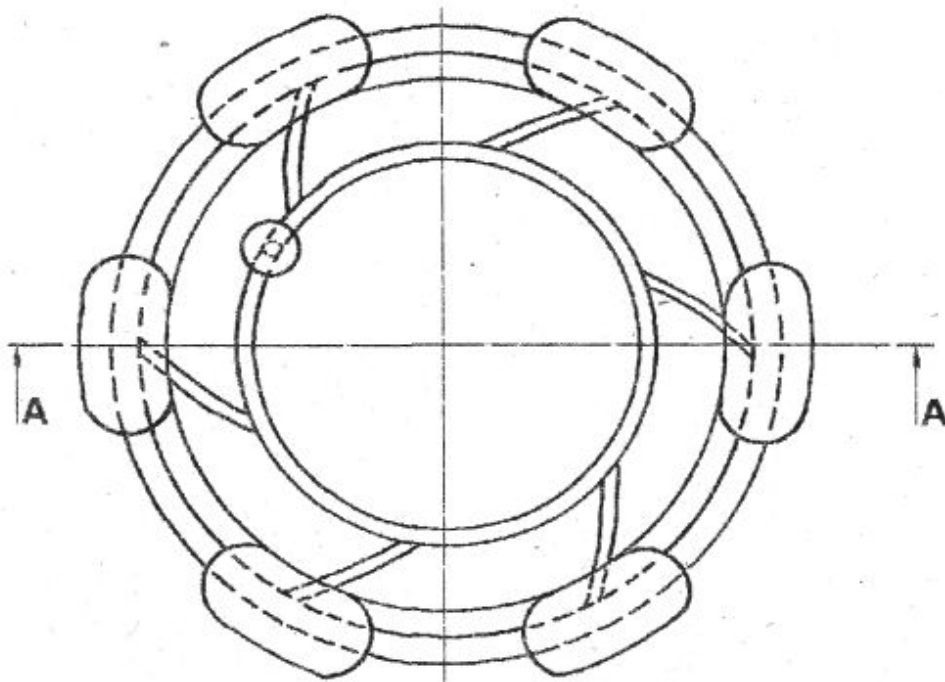
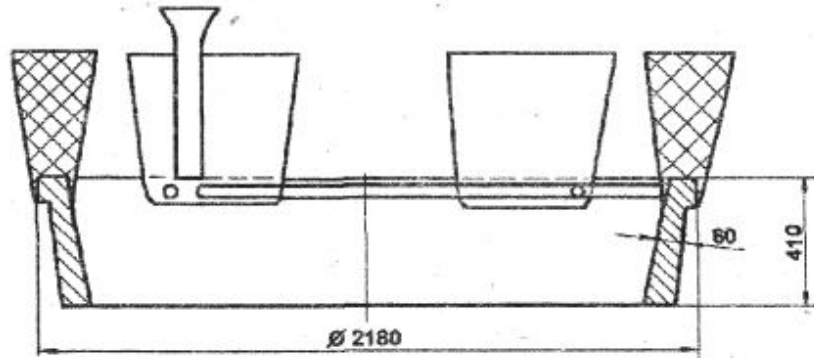
Сплав	Толщина стенки отливки, мм	$H_{\text{доп}}$
Чугун	4-2	$(30-100) \tau_{\text{ОПТ}}$
	10-4	$(20-30) \tau_{\text{ОПТ}}$
	40-10	$(10-20) \tau_{\text{ОНТ}}$
углеродистая	7-10	$20 \tau_{\text{ОПТ}}$
	10-40	$(20-10) \tau_{\text{ОПТ}}$
	>40	$(8-10) \tau_{\text{ОНТ}}$

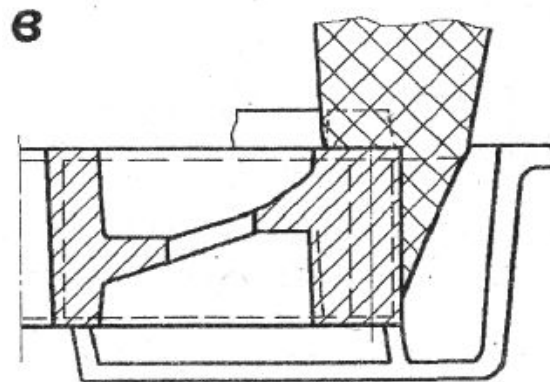
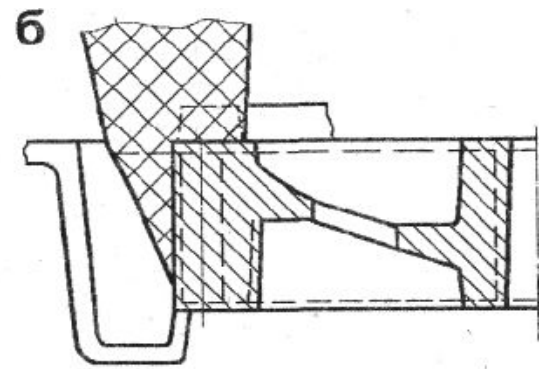
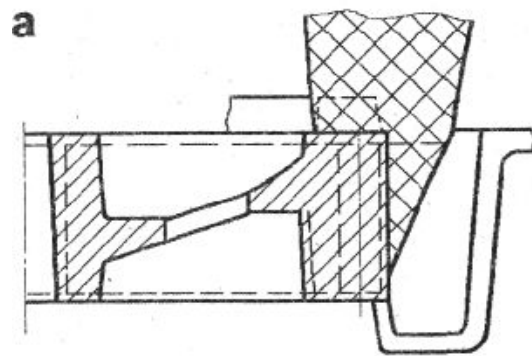
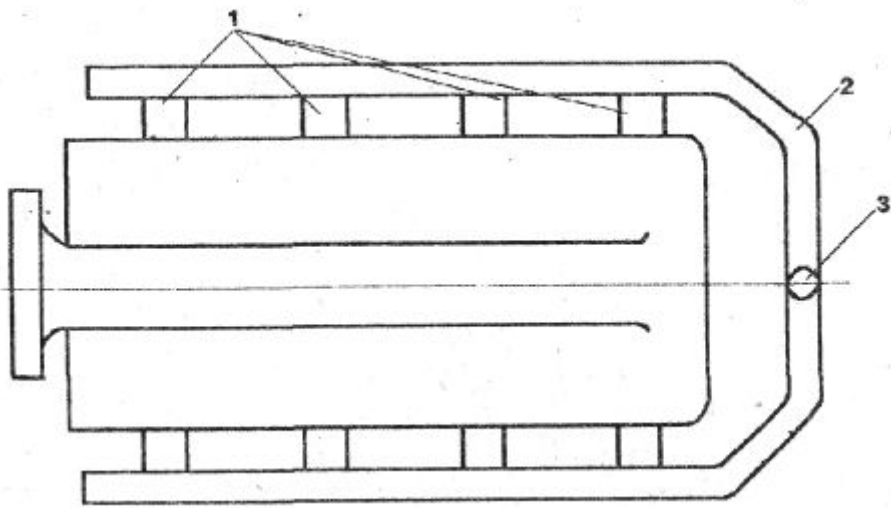


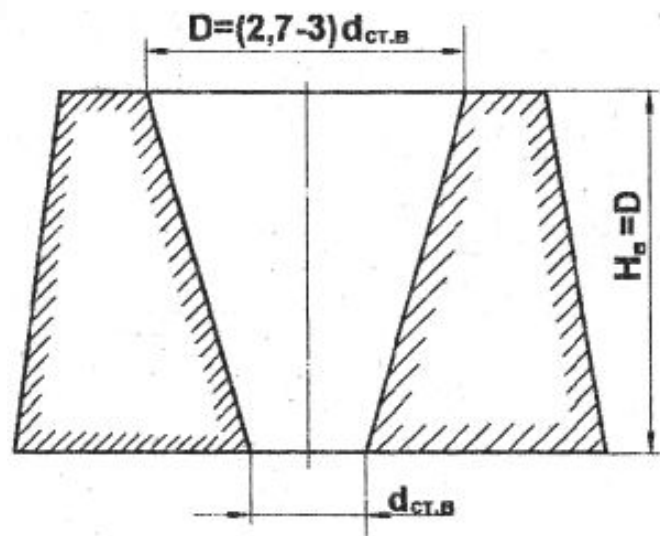
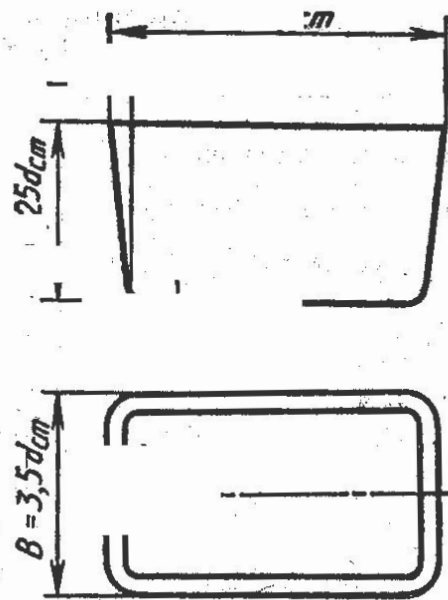
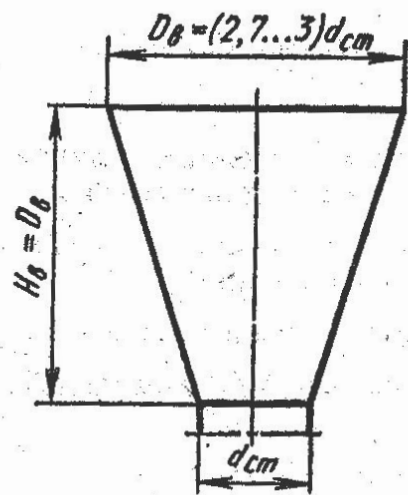
A-A

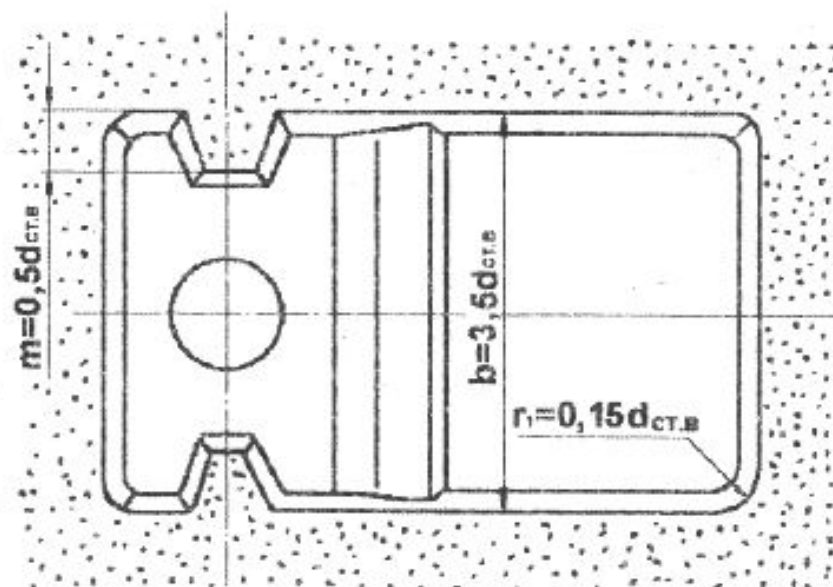
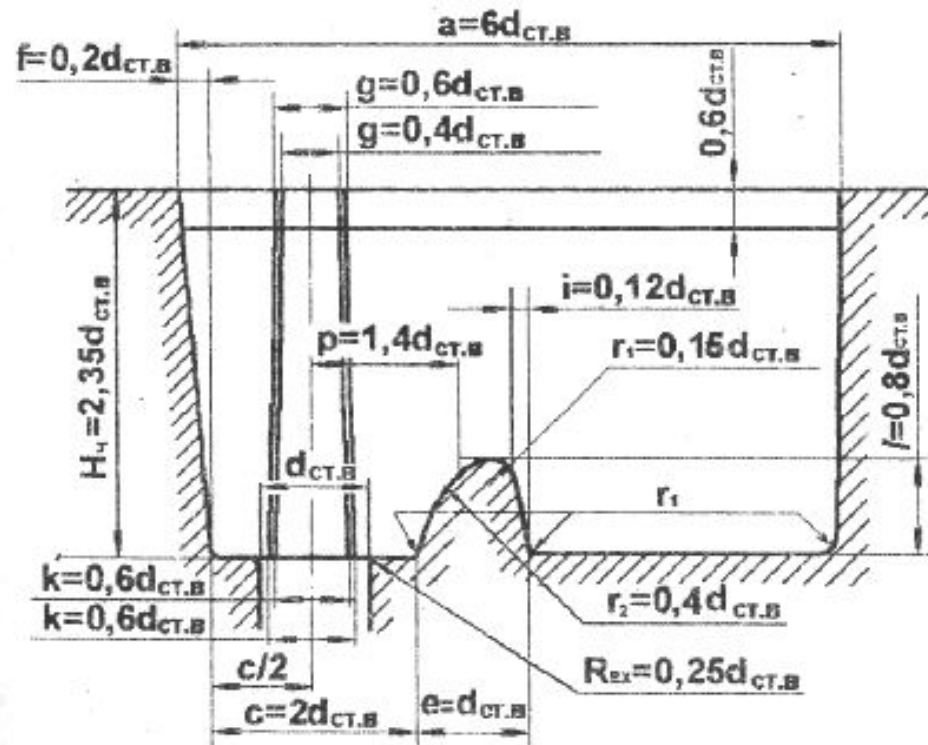


A - A

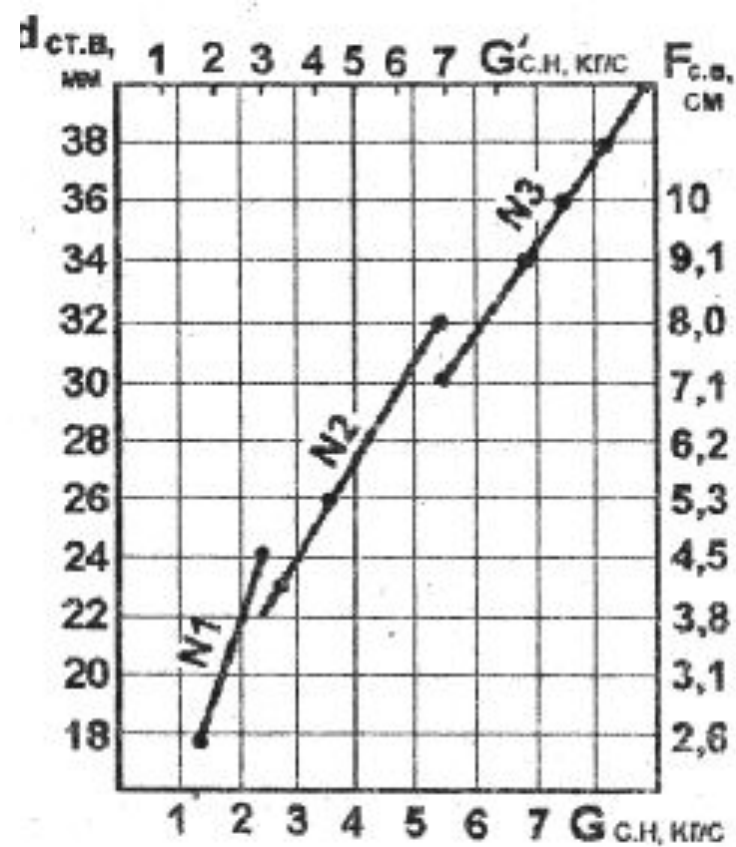




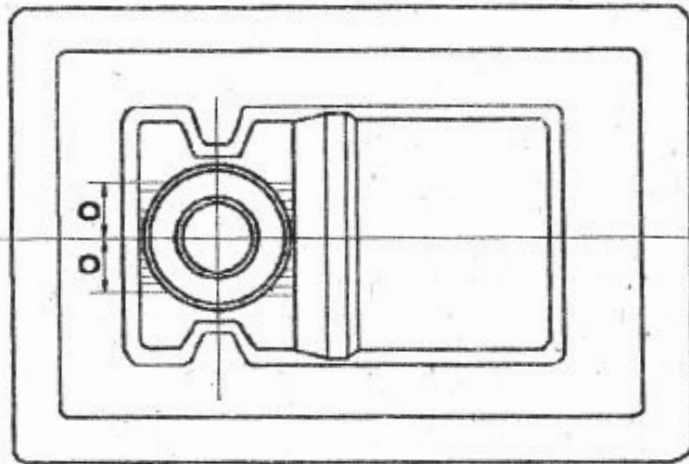
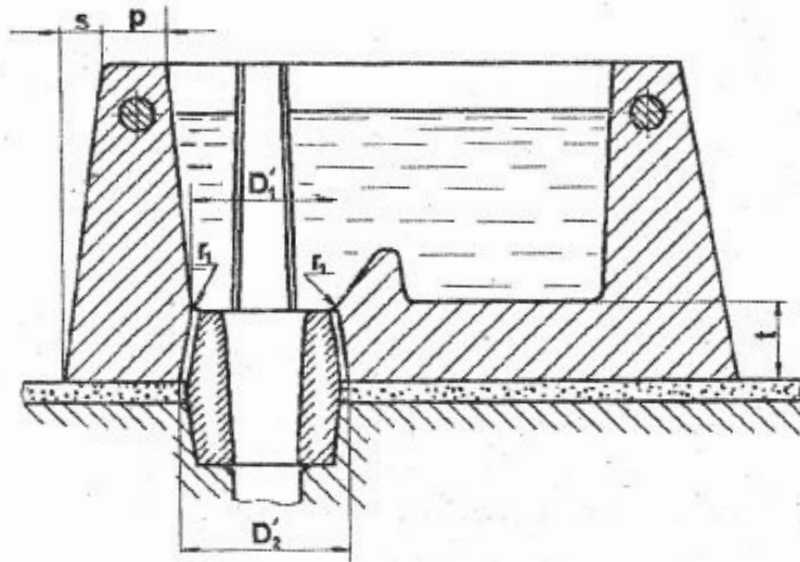




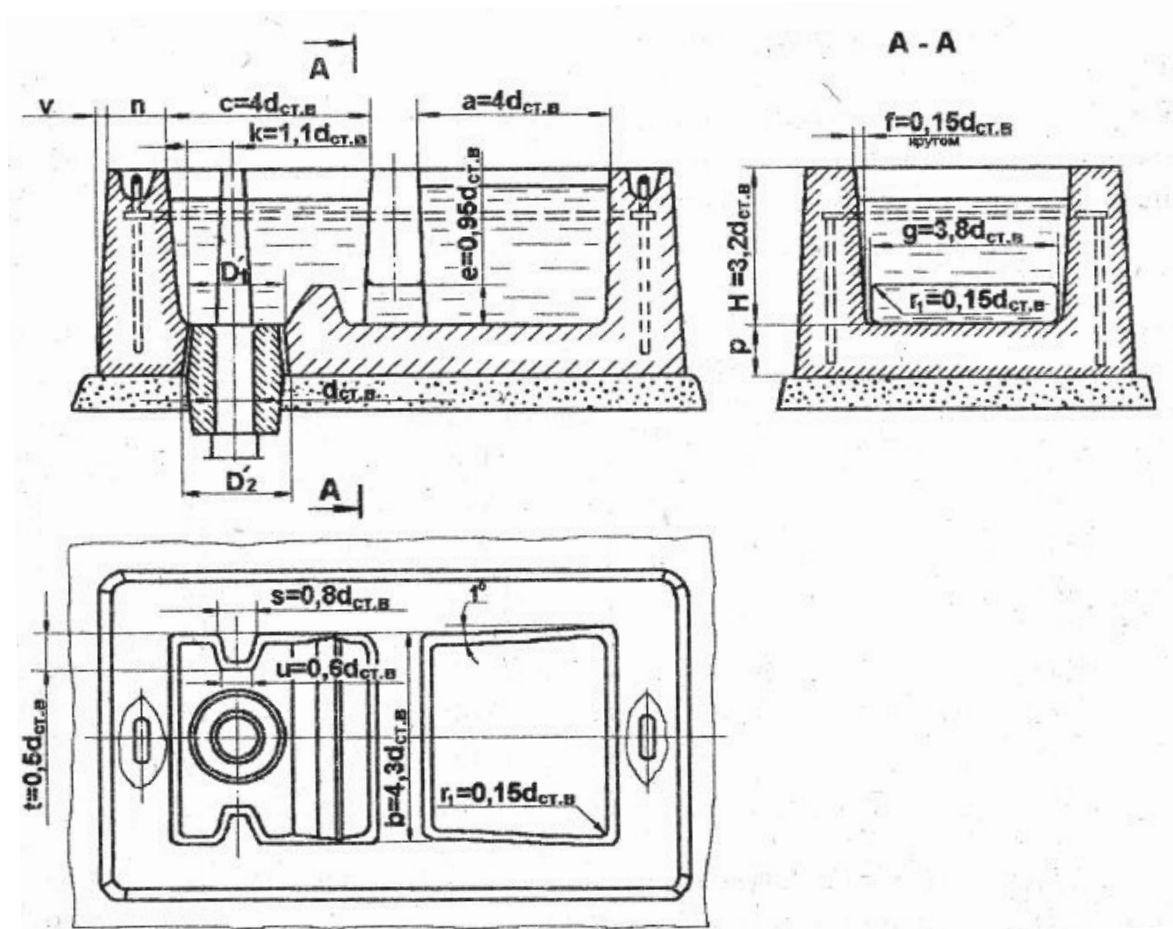
d

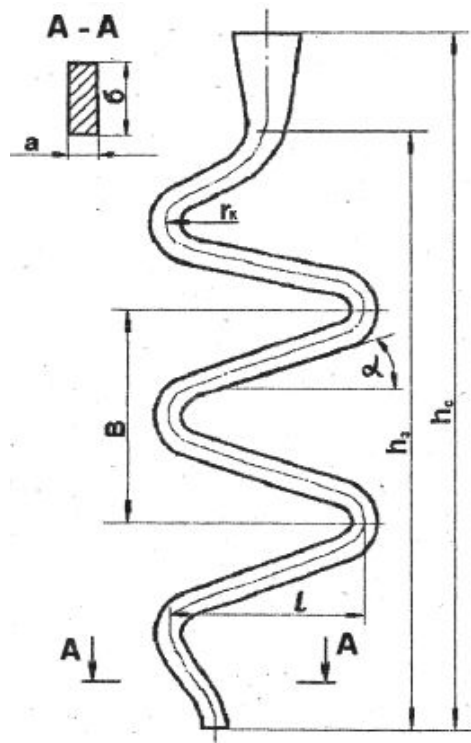
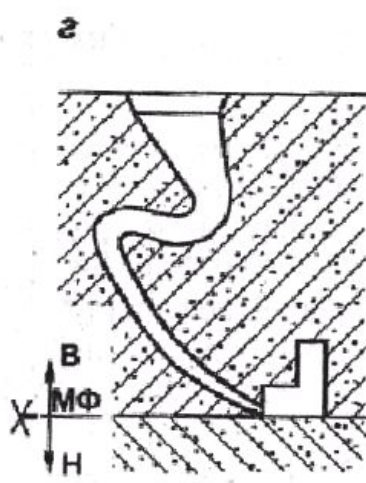
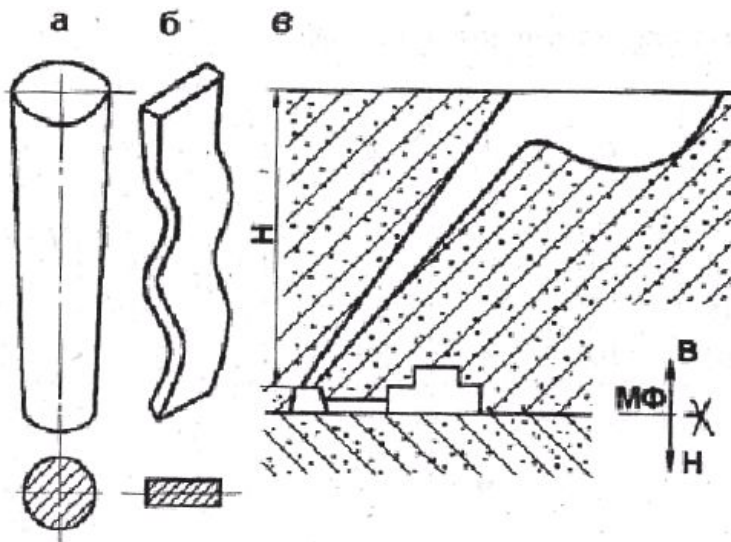


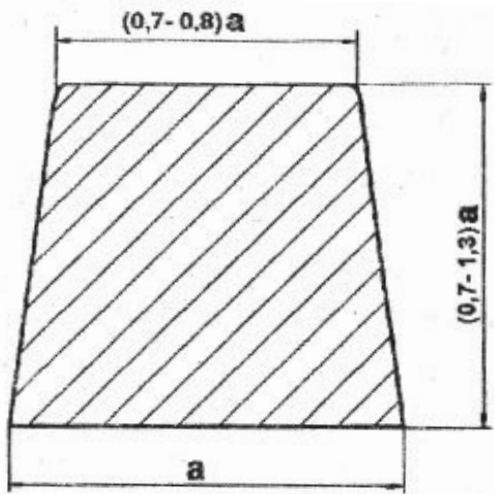




Номер чащи	Номер стакана	Размер, мм					
		$D_1$	$D_2$	$o$	$P$	$s$	$t$
1	1	46	56	13	30	10	30
2	2	65	77	20	35	12	45
3	2	65	77		35	15	45

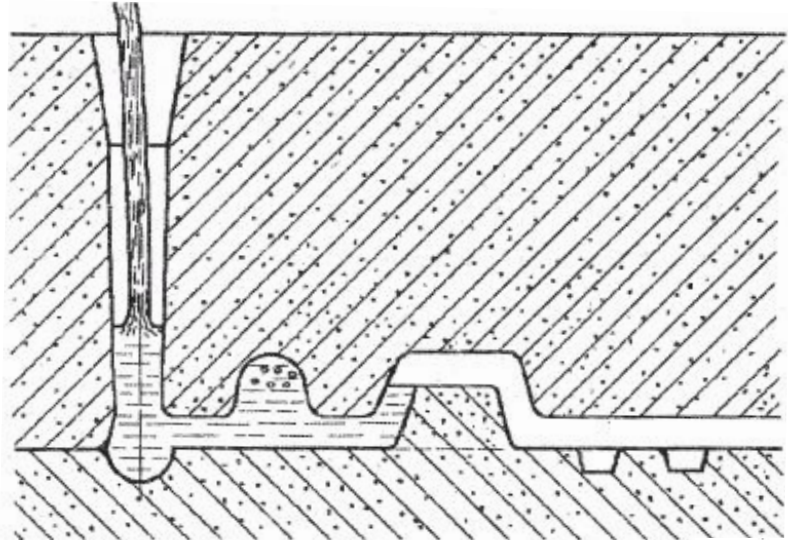




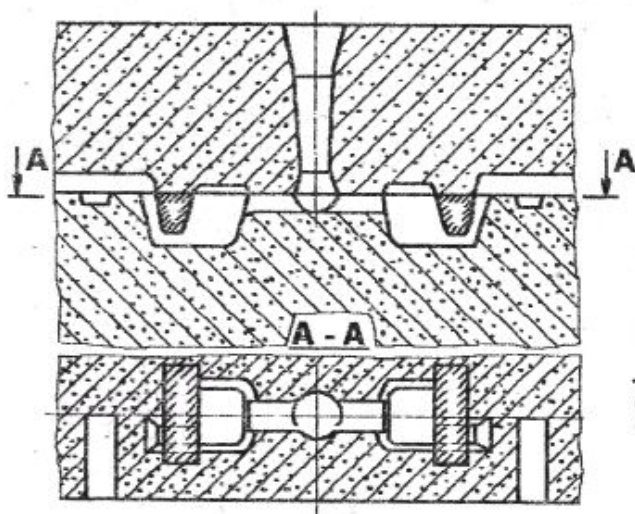


$$V_{\text{ш}} = \frac{G_{\text{жс}}}{\tau_{\text{опт}} \cdot \rho_{\text{м}} f_{\text{шл}}}$$

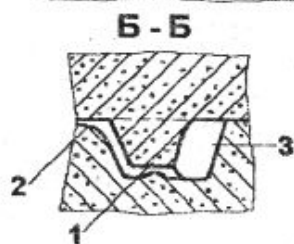
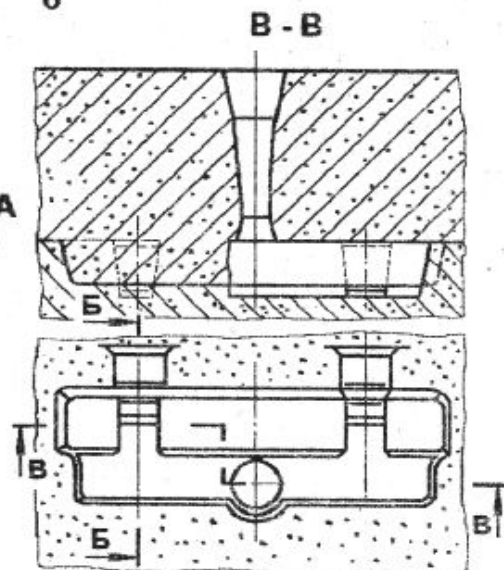
$$V_{\text{в}} = 2 \sqrt{\frac{d_{\text{ш}}}{3} \cdot \frac{\rho_{\text{м}} - \rho_{\text{ш}}}{\rho_{\text{м}}} \cdot g}$$

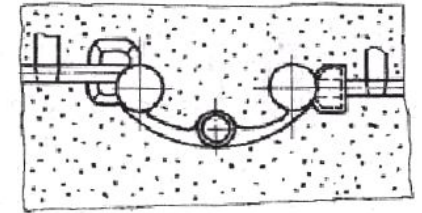
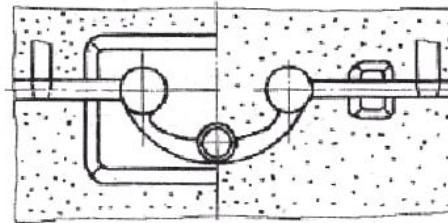
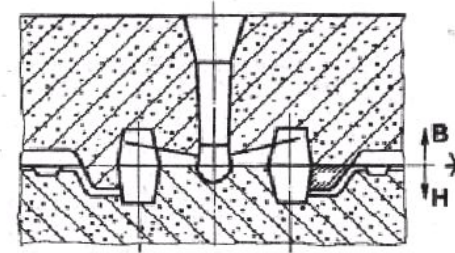
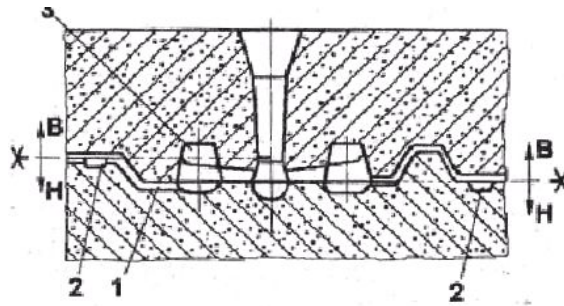
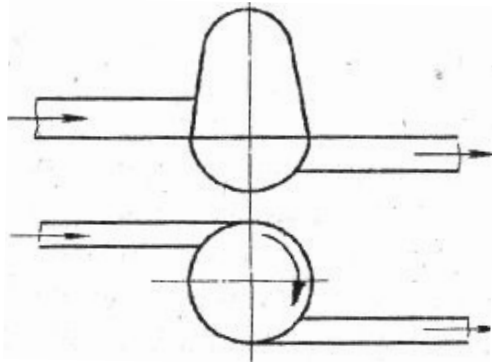


a

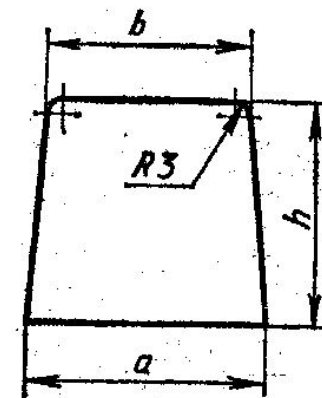


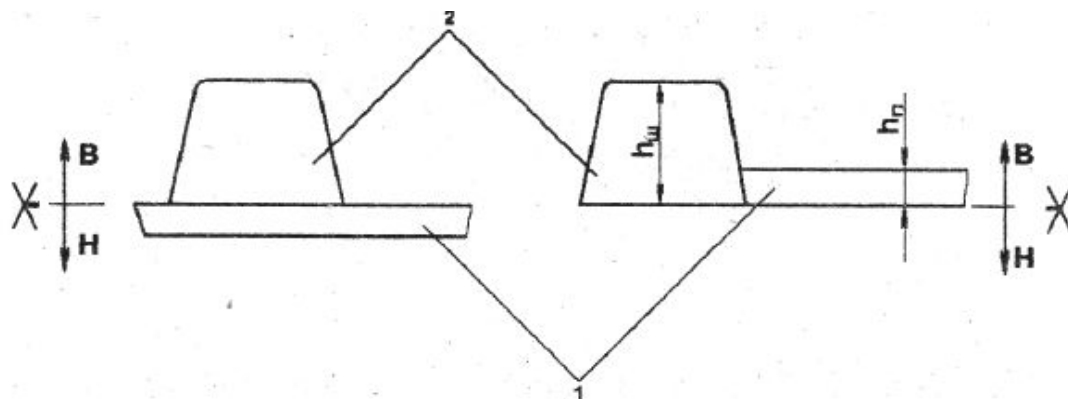
б



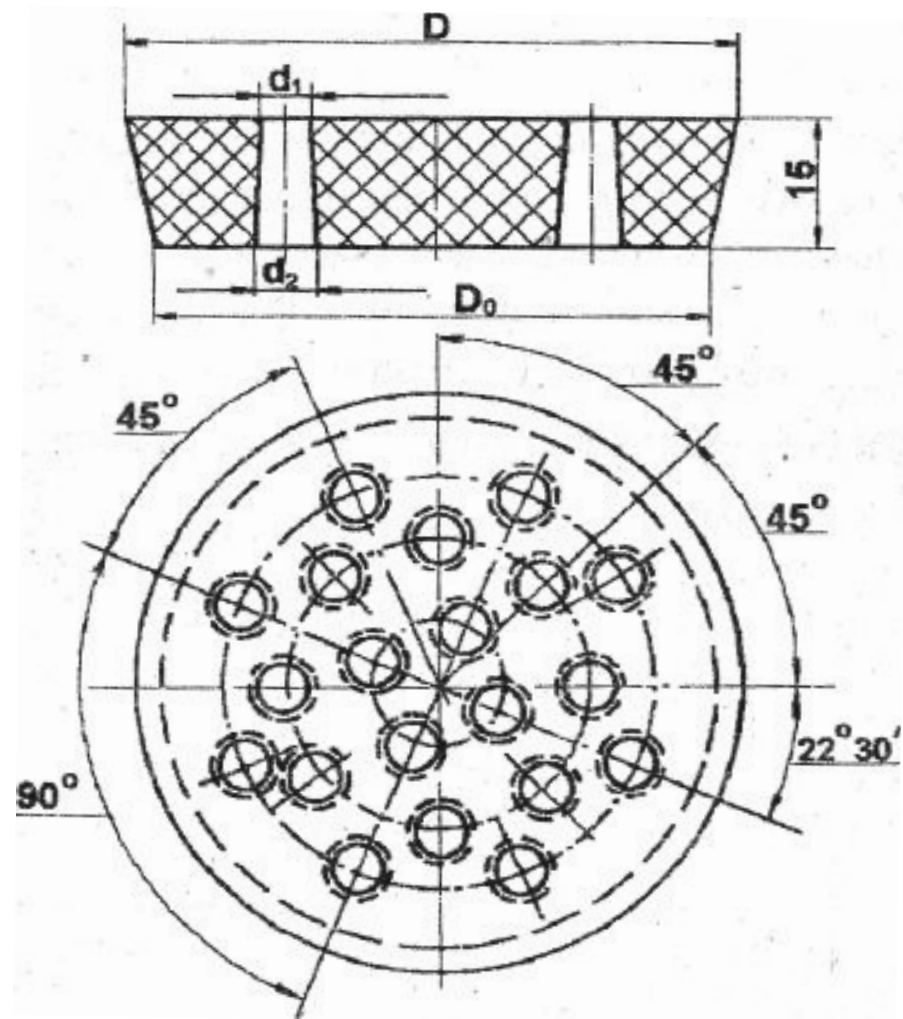


$F_{ui}$ $\text{cm}^2$	$a$	$b$	$h$
	MM		
1,0	11/-	8/-	11/-
1,3	12/11	10/8	12/14
1,6	14/12	10/a	14/15
2,0	15/15	12/10	15/17
2,5	16/15	13/11	16/19
3,2	18/16	14/12	18/21
4,0	22/18	18/13	22/25
5,0	24/22	19/16	24/27
6,3	26/24	20/18	26/30
8,0	30/26	27/19	30/35
10,0	34/30	28/22	33/38
12,5	38/34	30/26	38/43
16,0	42/38	34/29	42/48
20,0	48/42	38/32	48/52

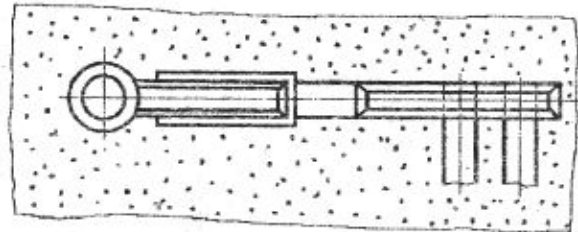
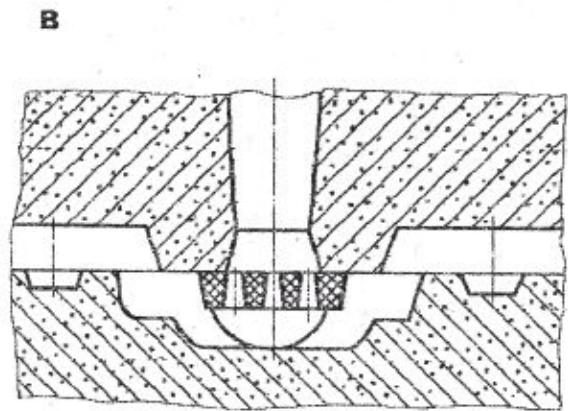
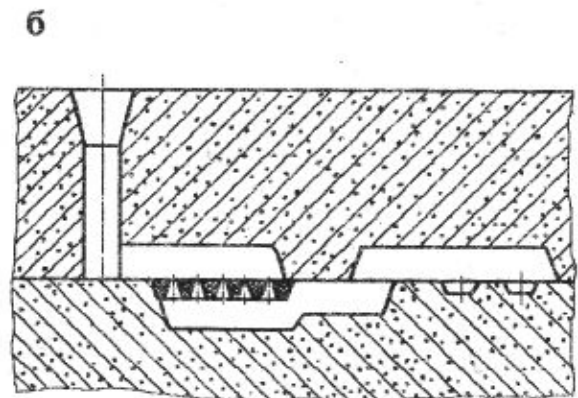
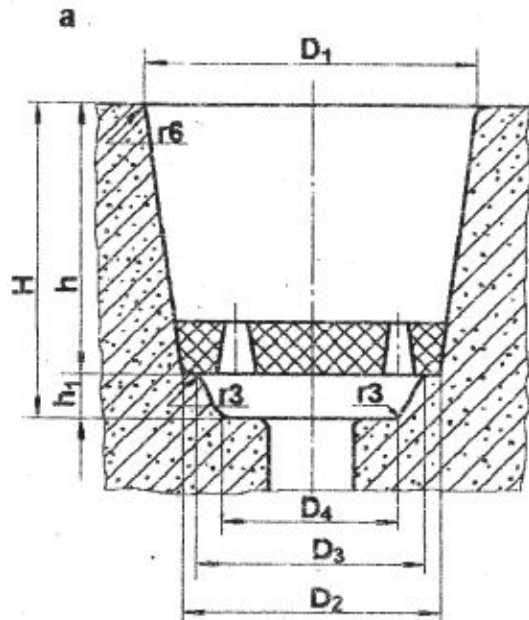


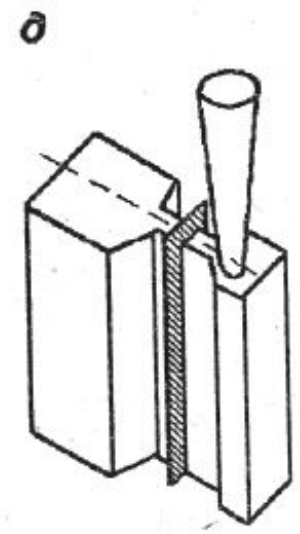
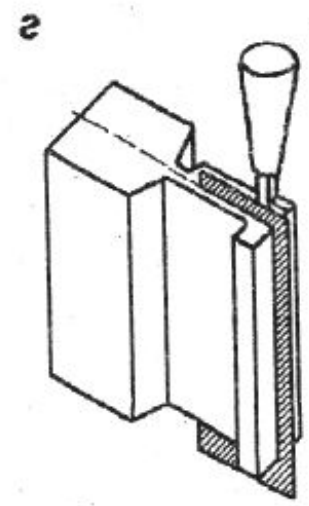
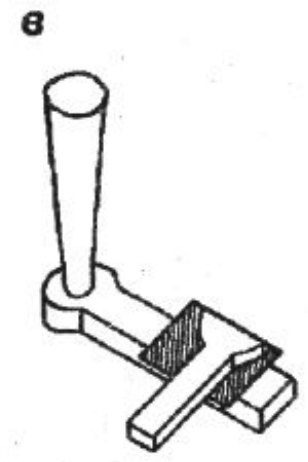
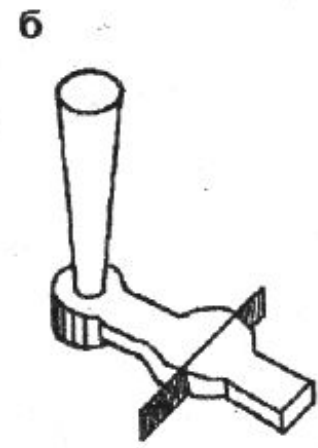
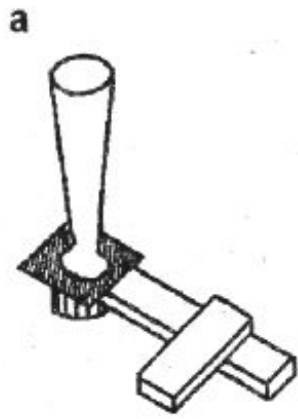


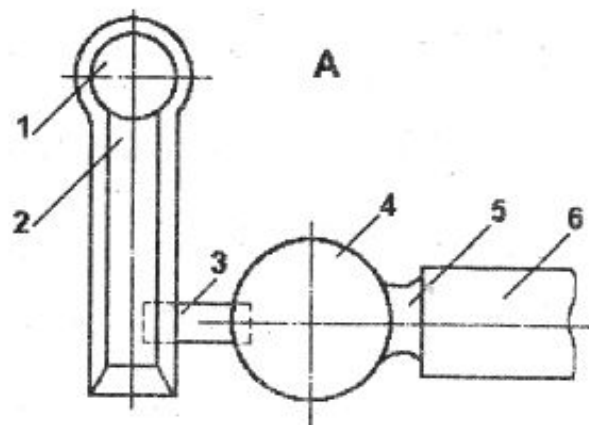
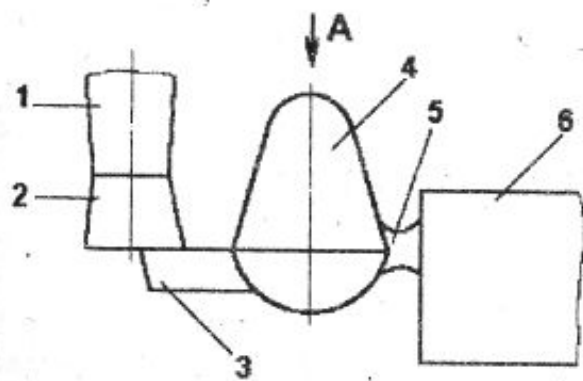
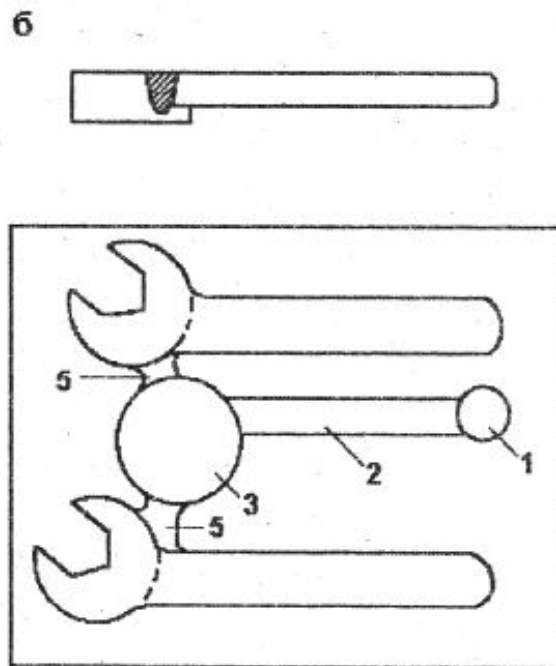
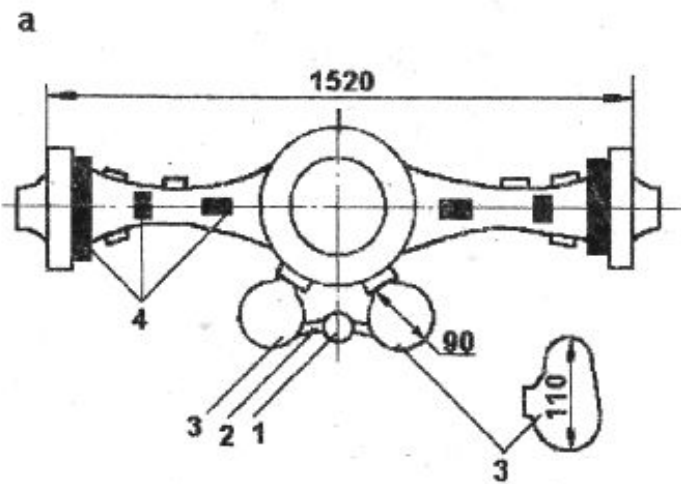
Тип питателя	b	h
Плоский	$(0,7 - 0,9) a$	$(0,1 - 0,5) a$
Нормальный	$(0,8 - 0,7) a$	a
Удлиненный	$(0,75 - 0,65) a$	$(1,5 - 2,0) a$

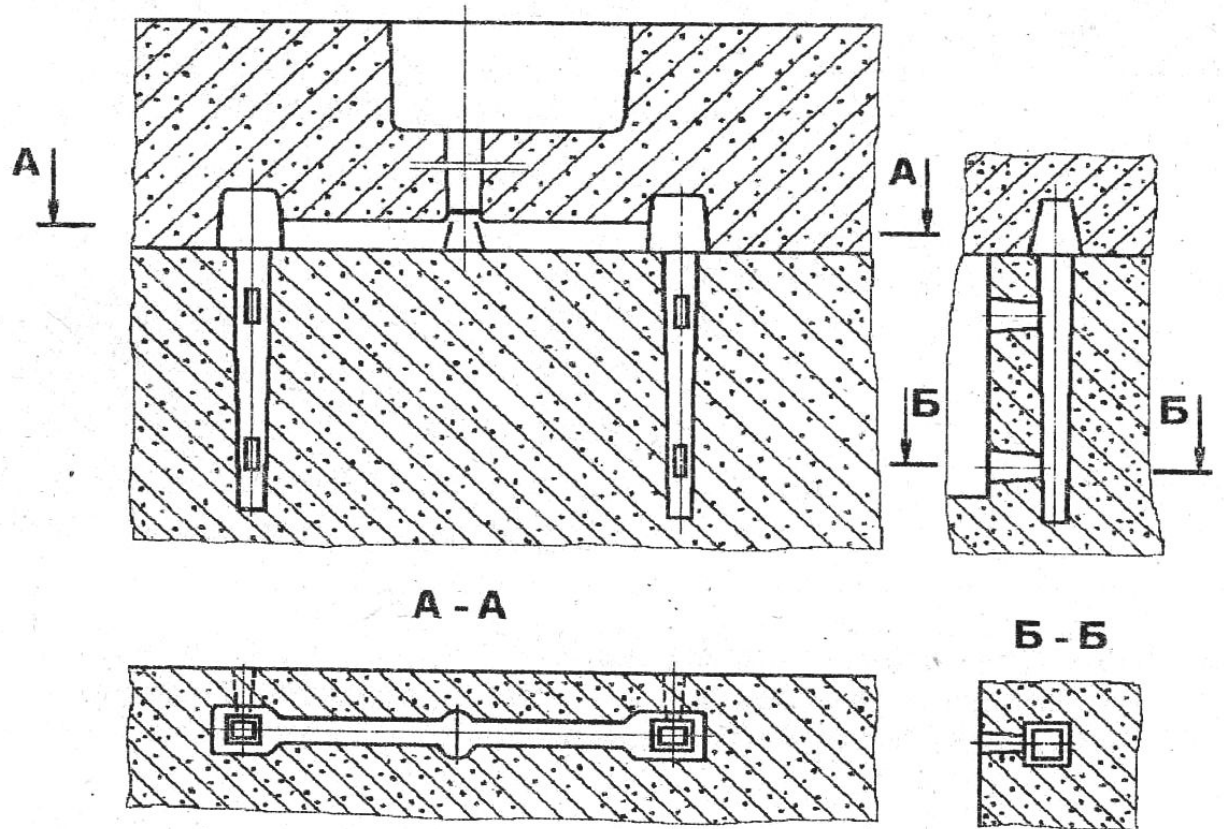
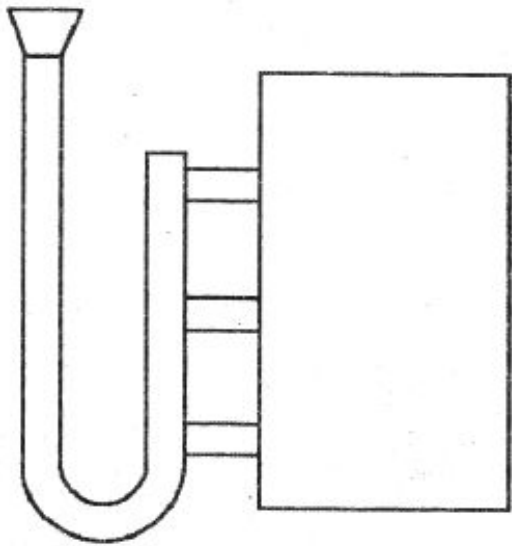




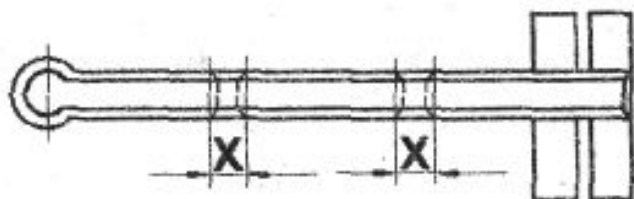
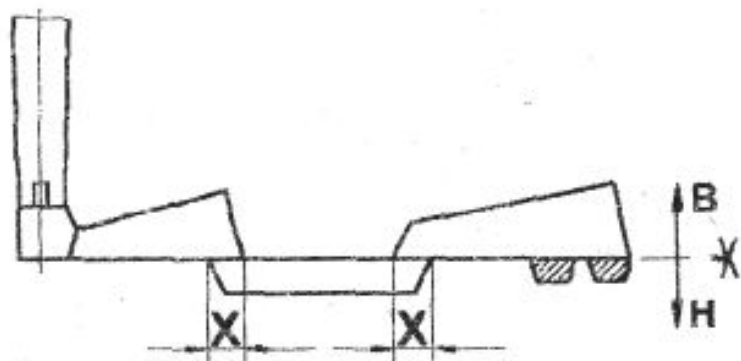




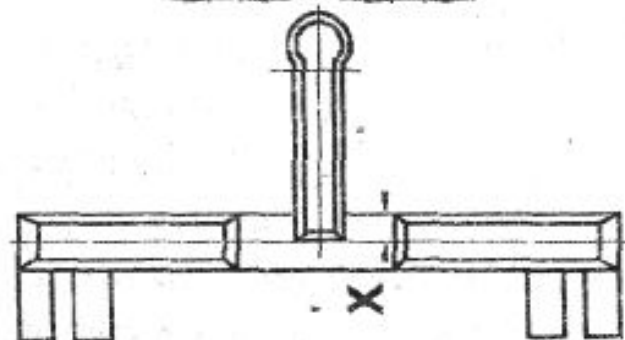
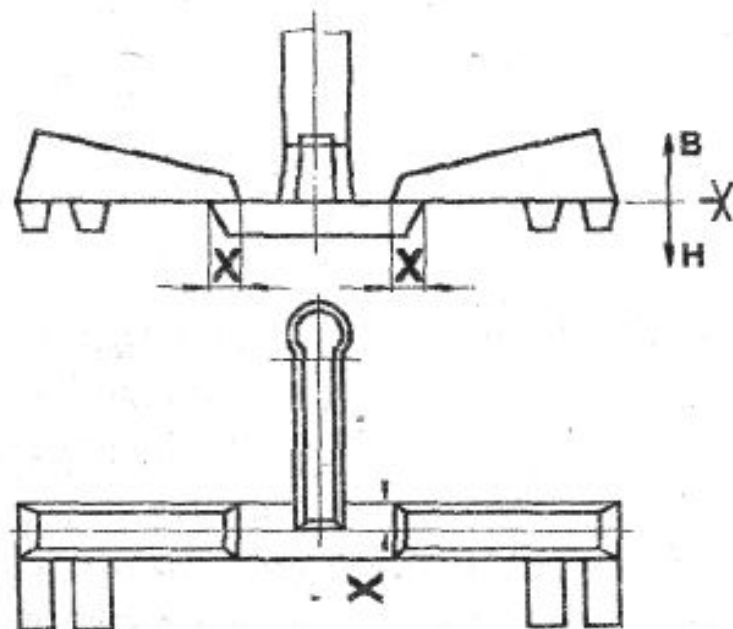




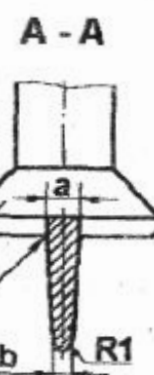
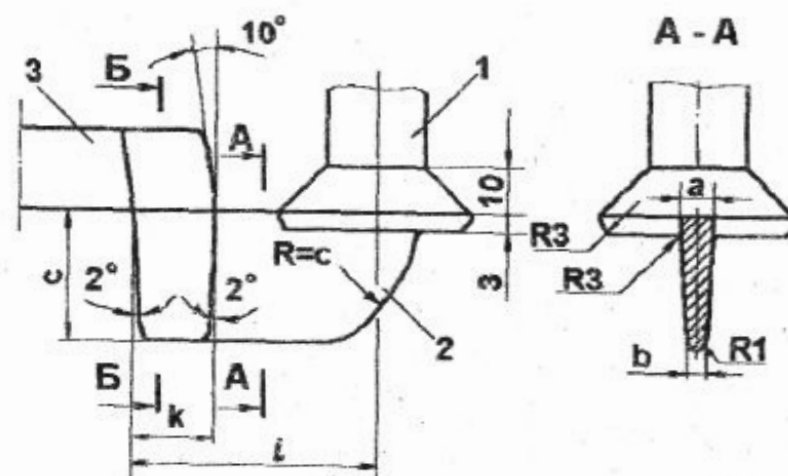
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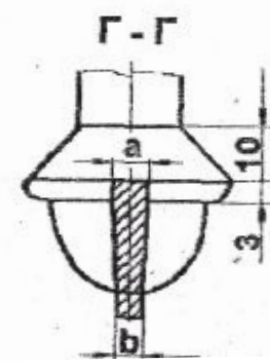
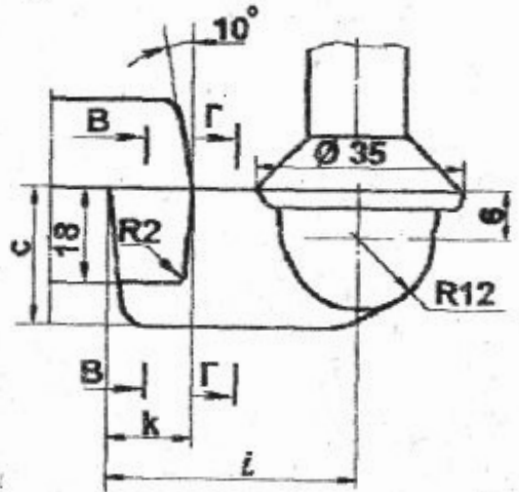
b



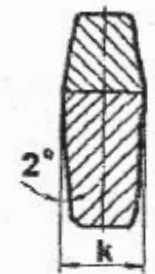
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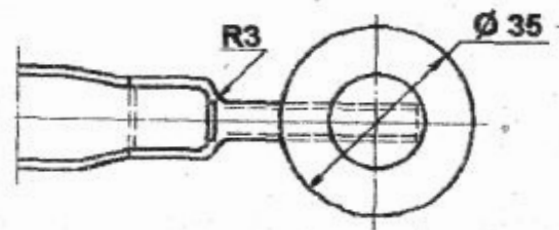
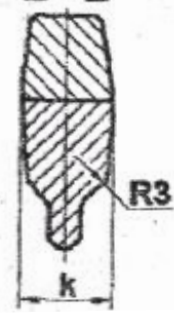
б

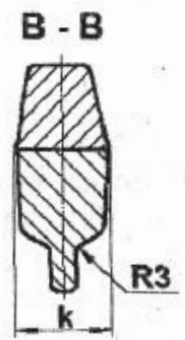
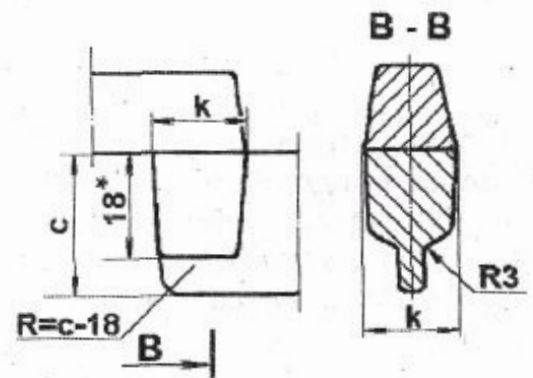
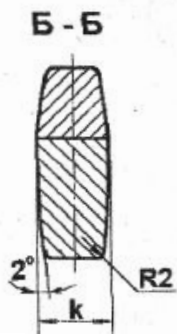
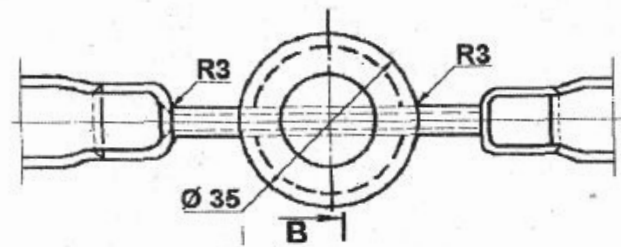
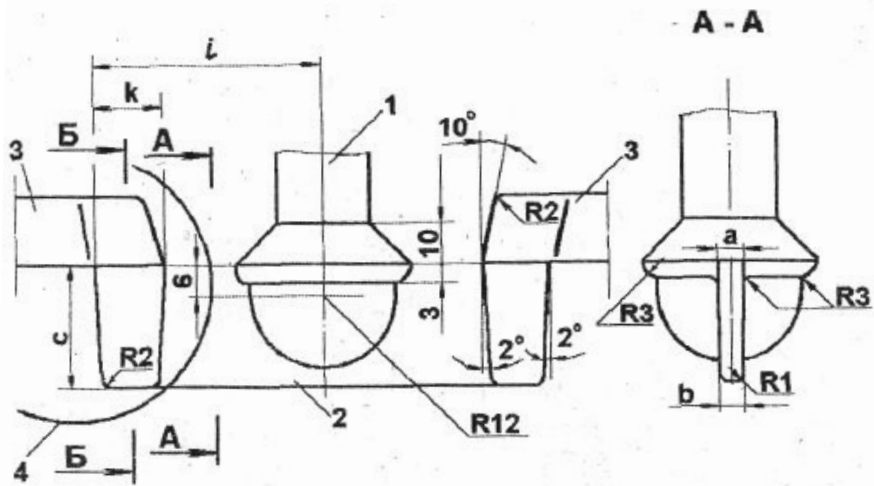


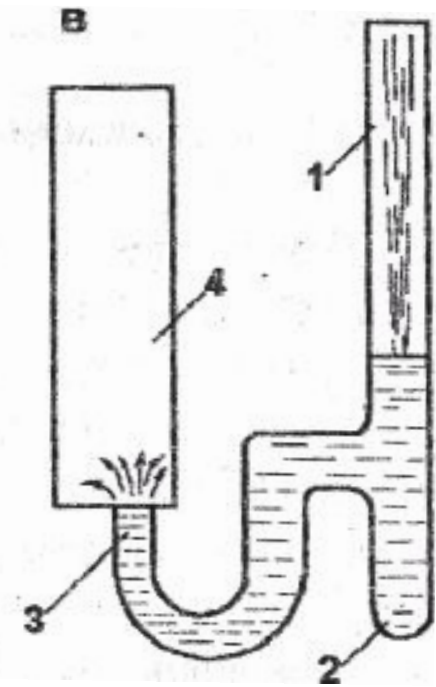
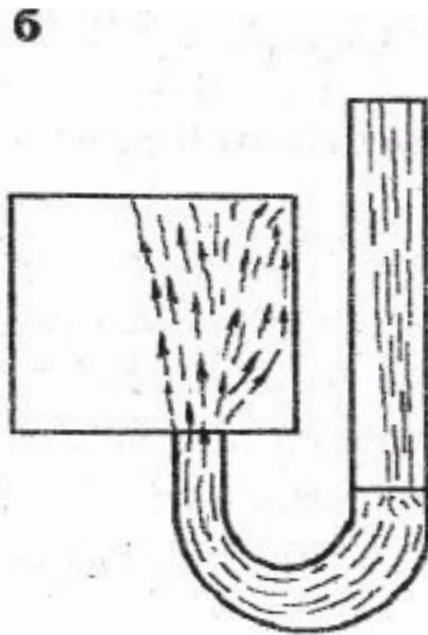
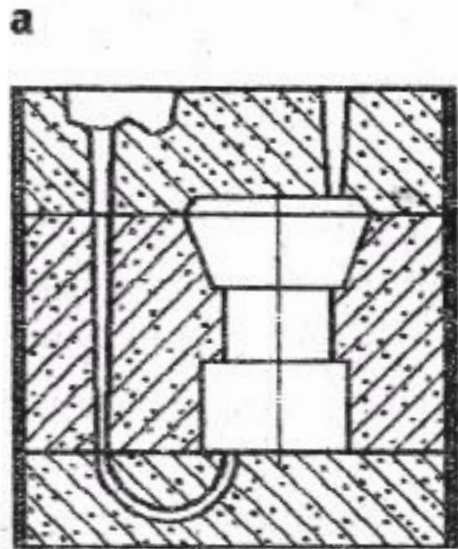
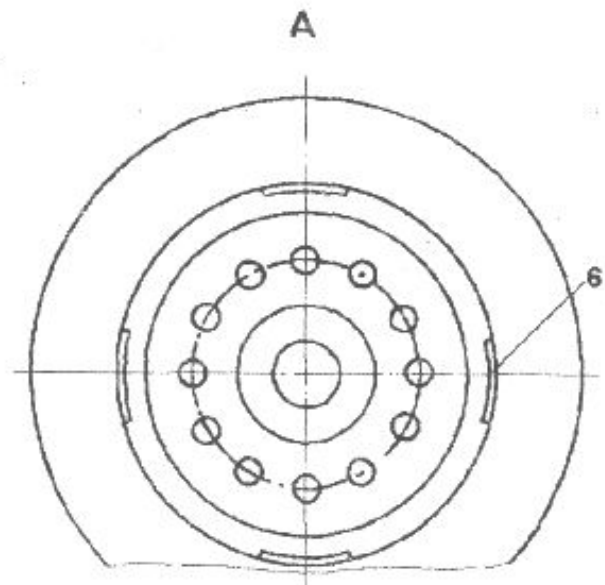
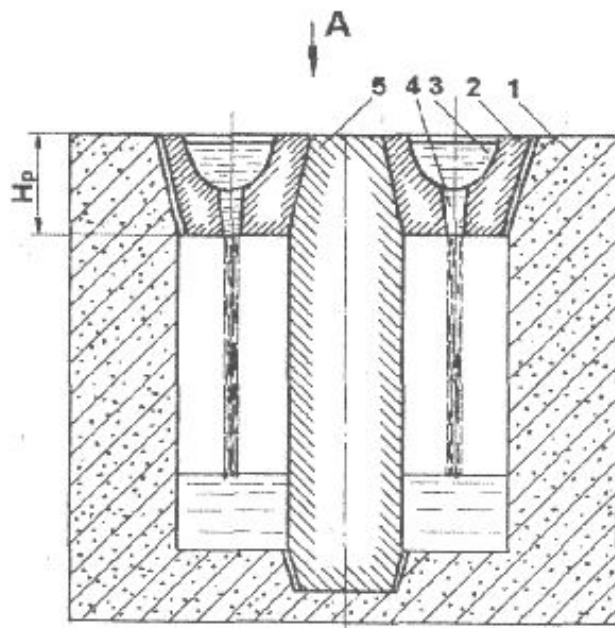
Б-Б



Б-Б

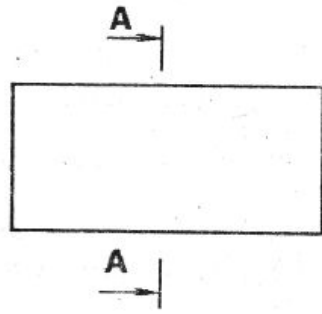








a



A - A



A - A



b

