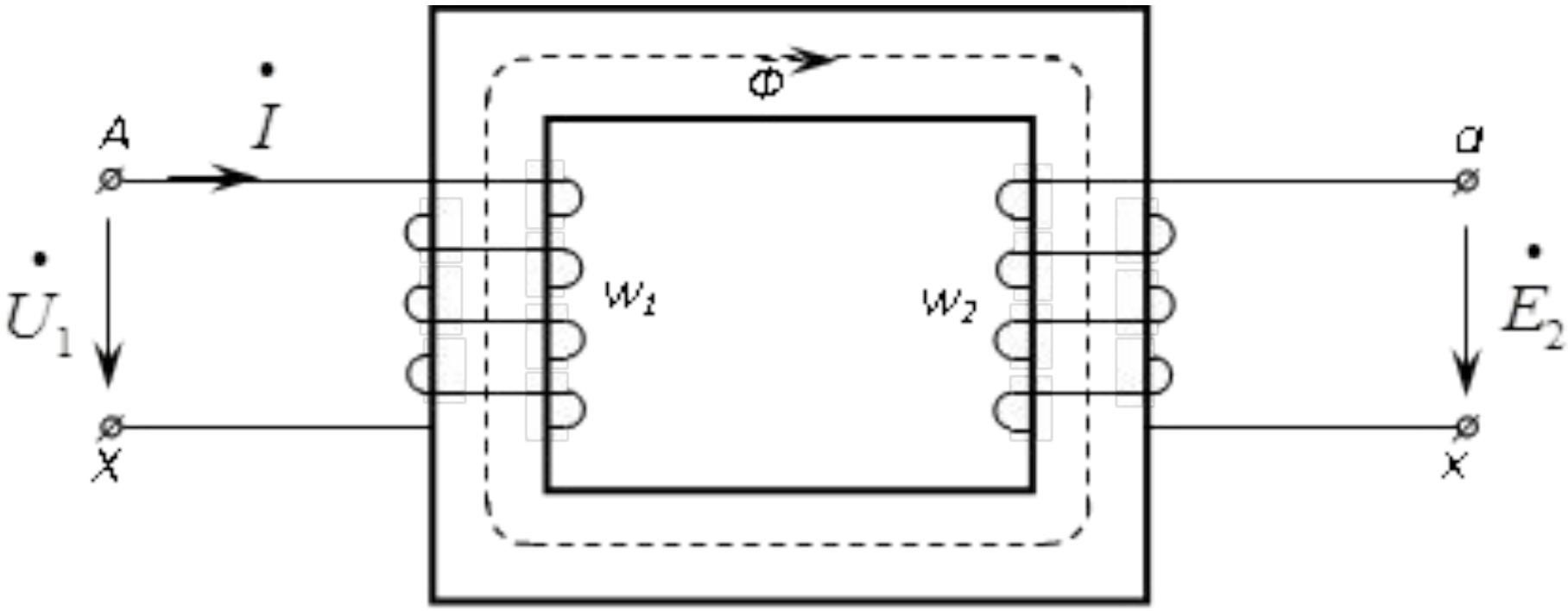


Рис. 2-1. Двухобмоточный трансформатор.

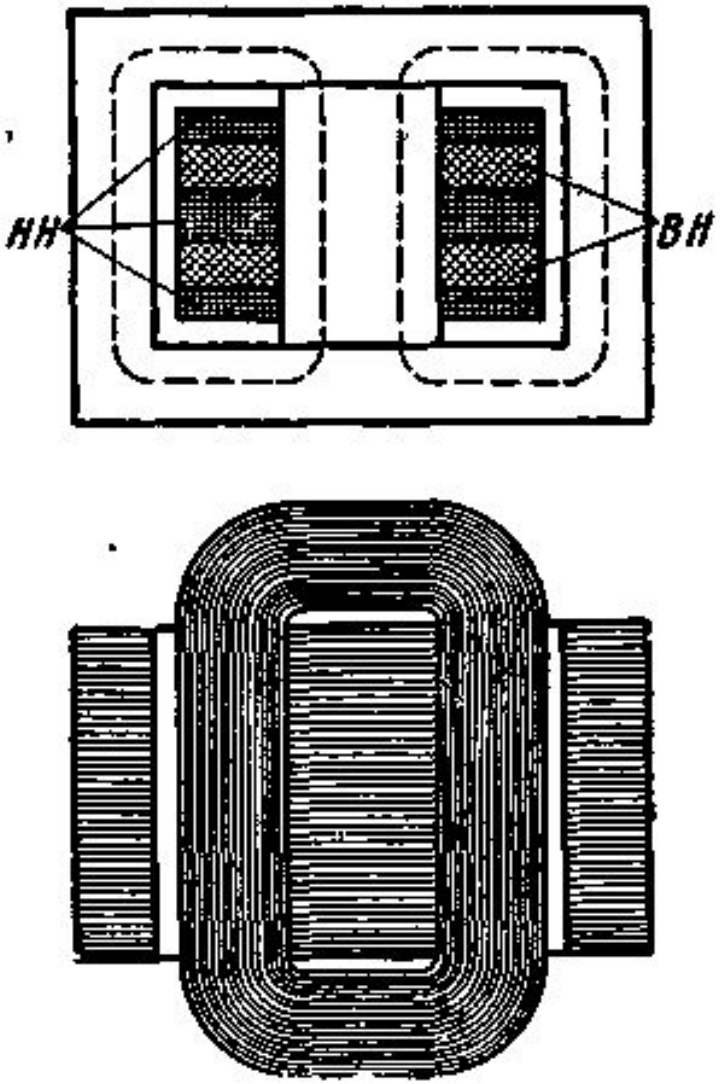


Рис. 2-8. Однофазный броневой трансформатор с дисковыми чередующимися обмотками.

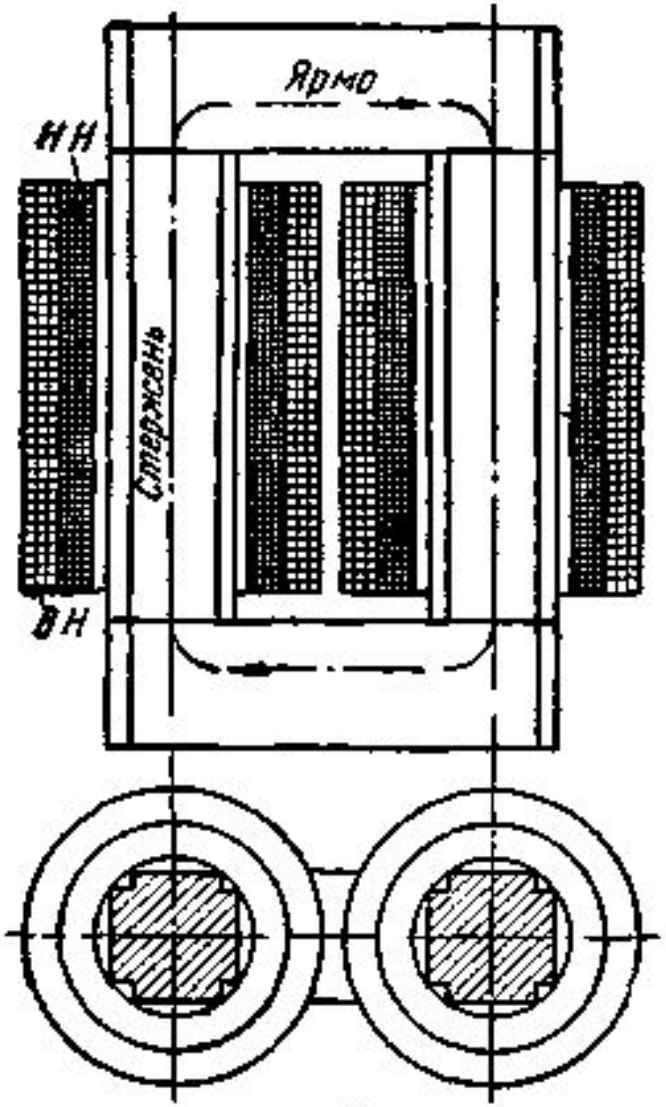
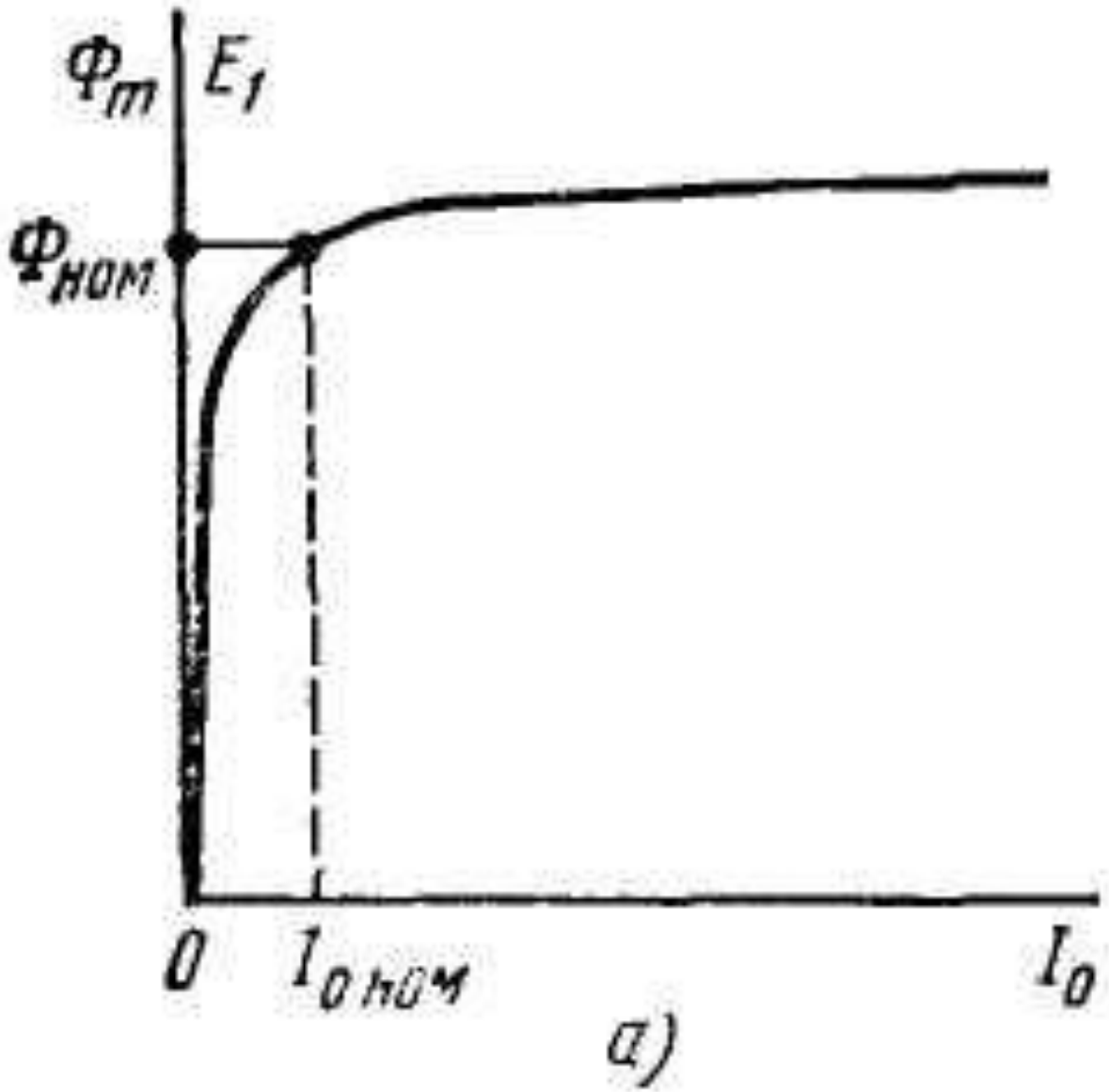
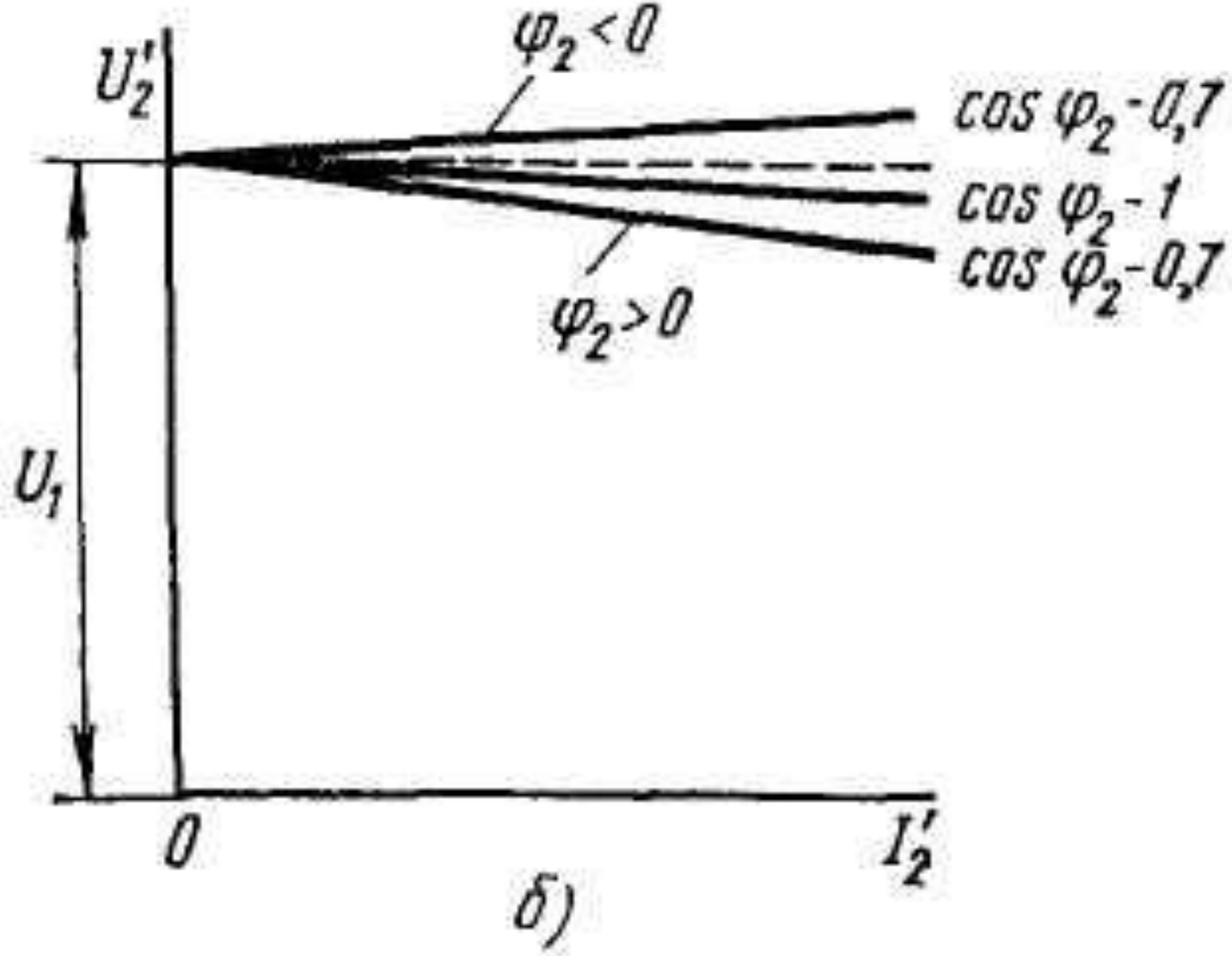


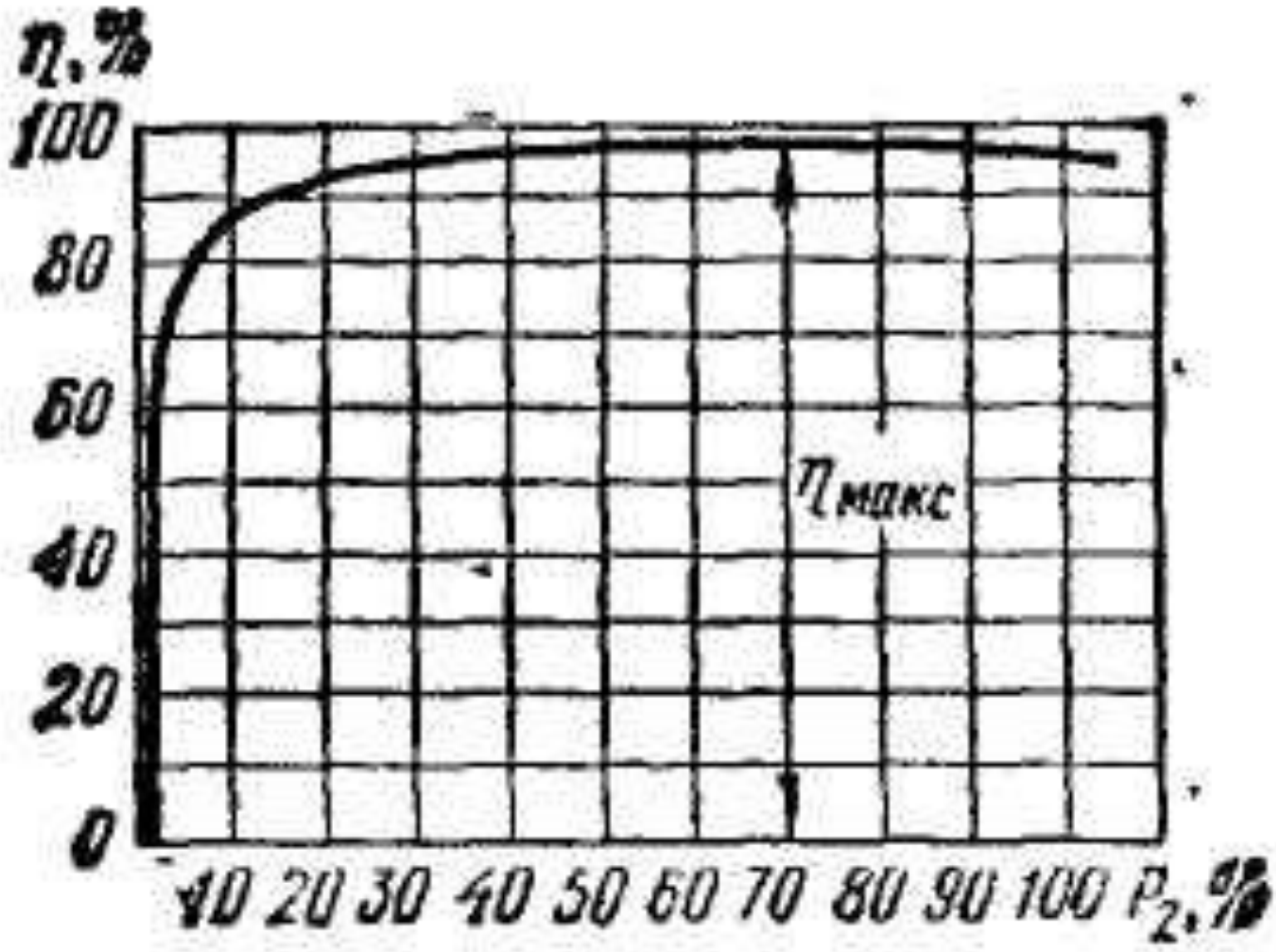
Рис. 2-9. Однофазный стержневой трансформатор с концентрическими обмотками.

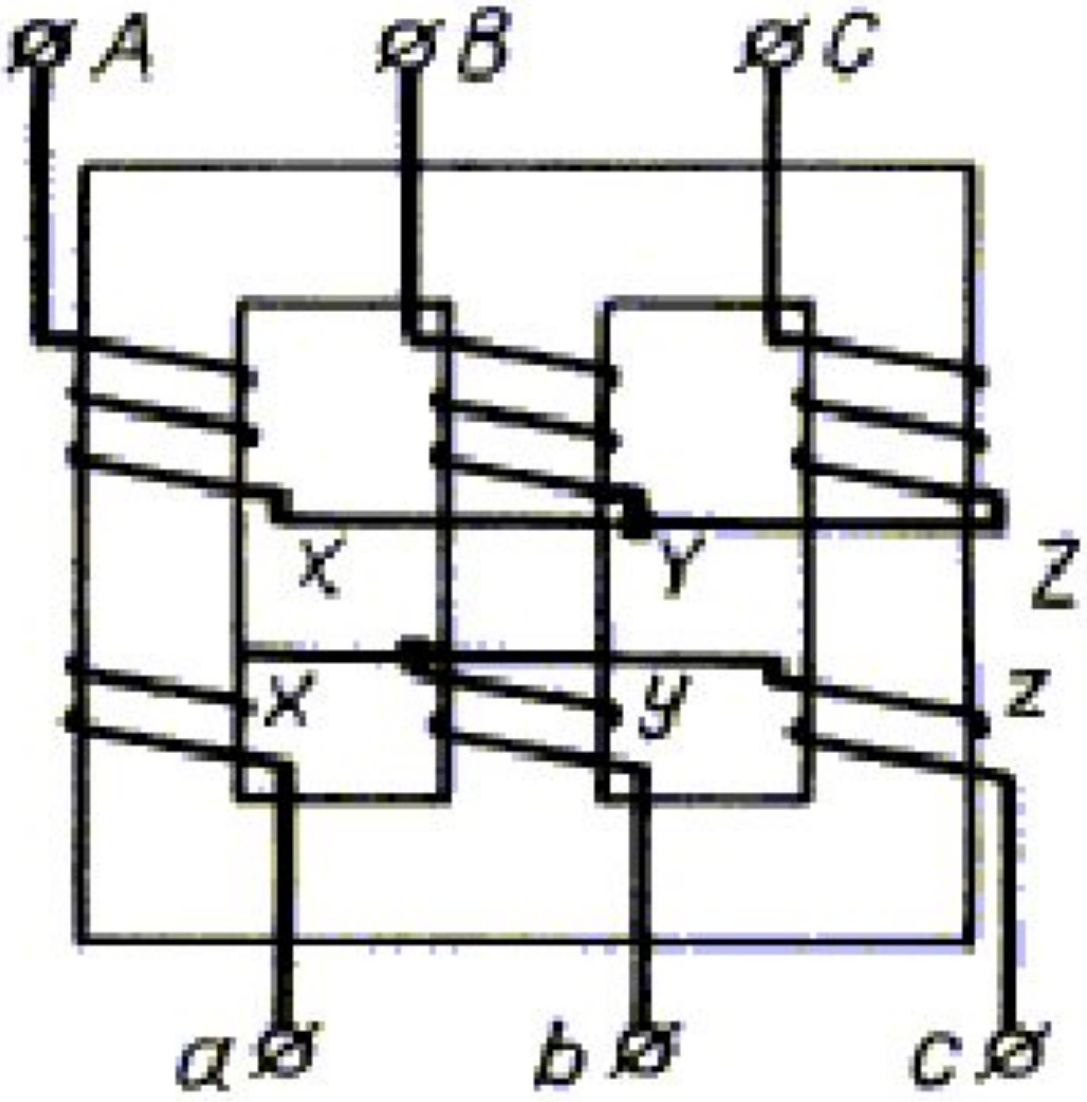


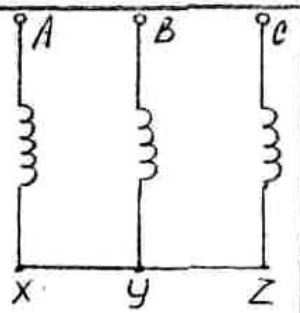
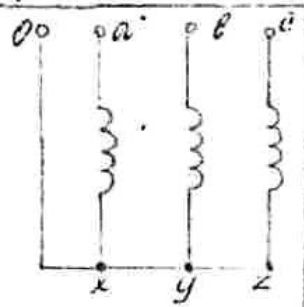
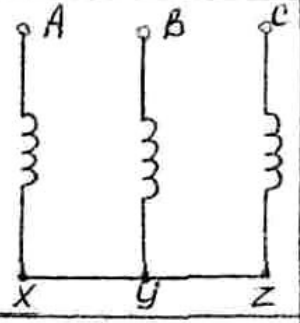
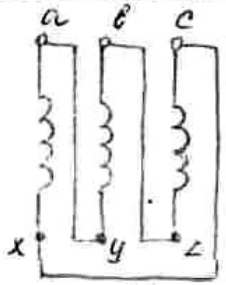
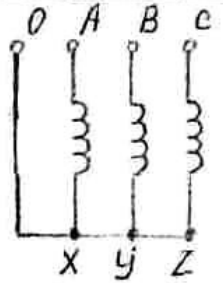
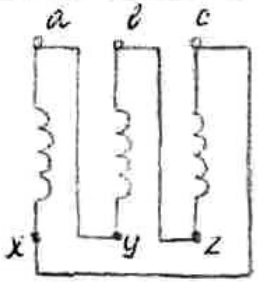
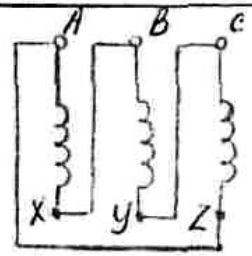
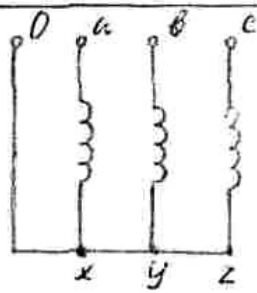
а)

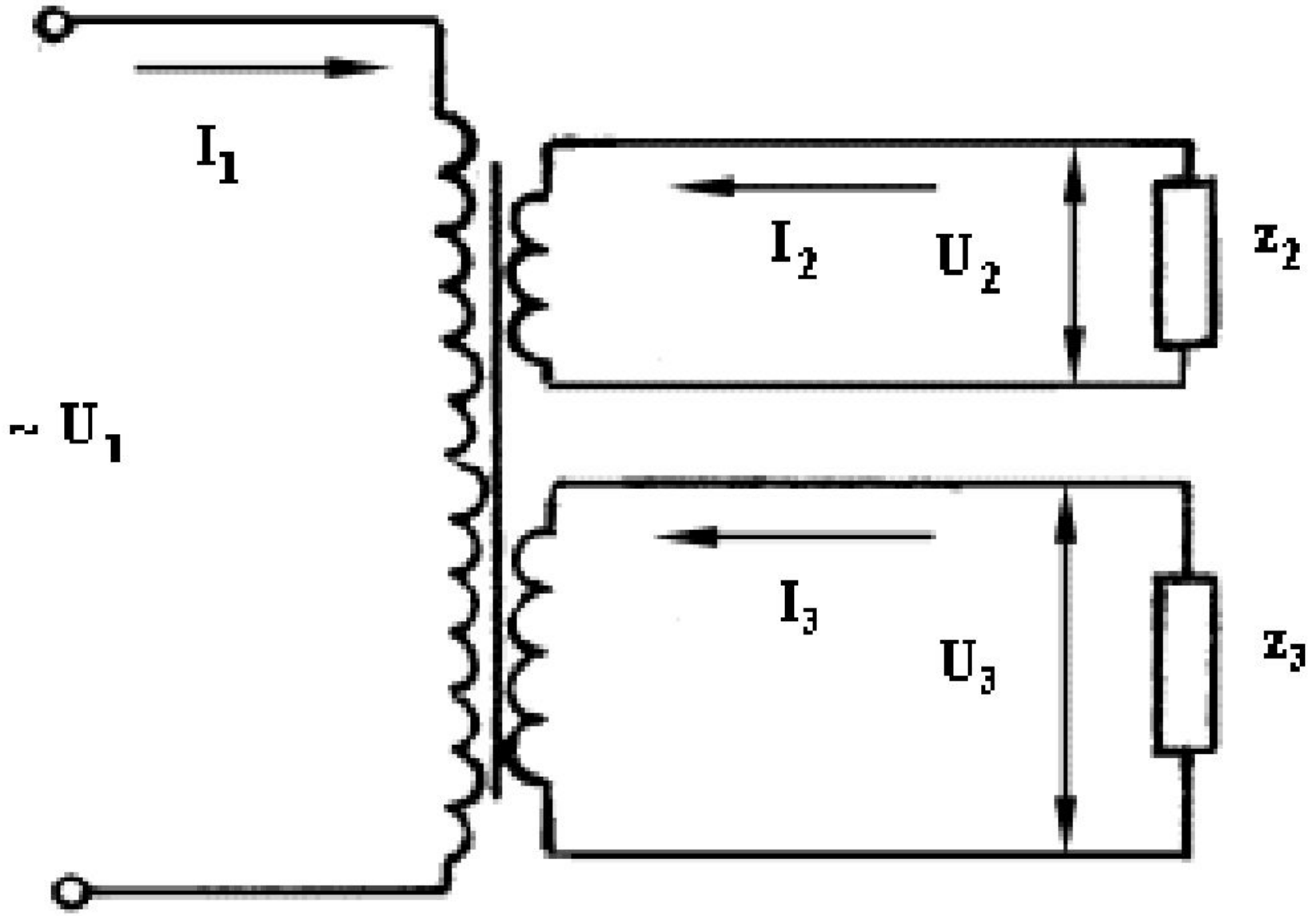

U_2'
$\varphi_2 < 0$
$\cos \varphi_2 - 0{,}7$
$\cos \varphi_2 - 1$
$\cos \varphi_2 - 0{,}7$
$\varphi_2 > 0$
U_1
0
I_2'

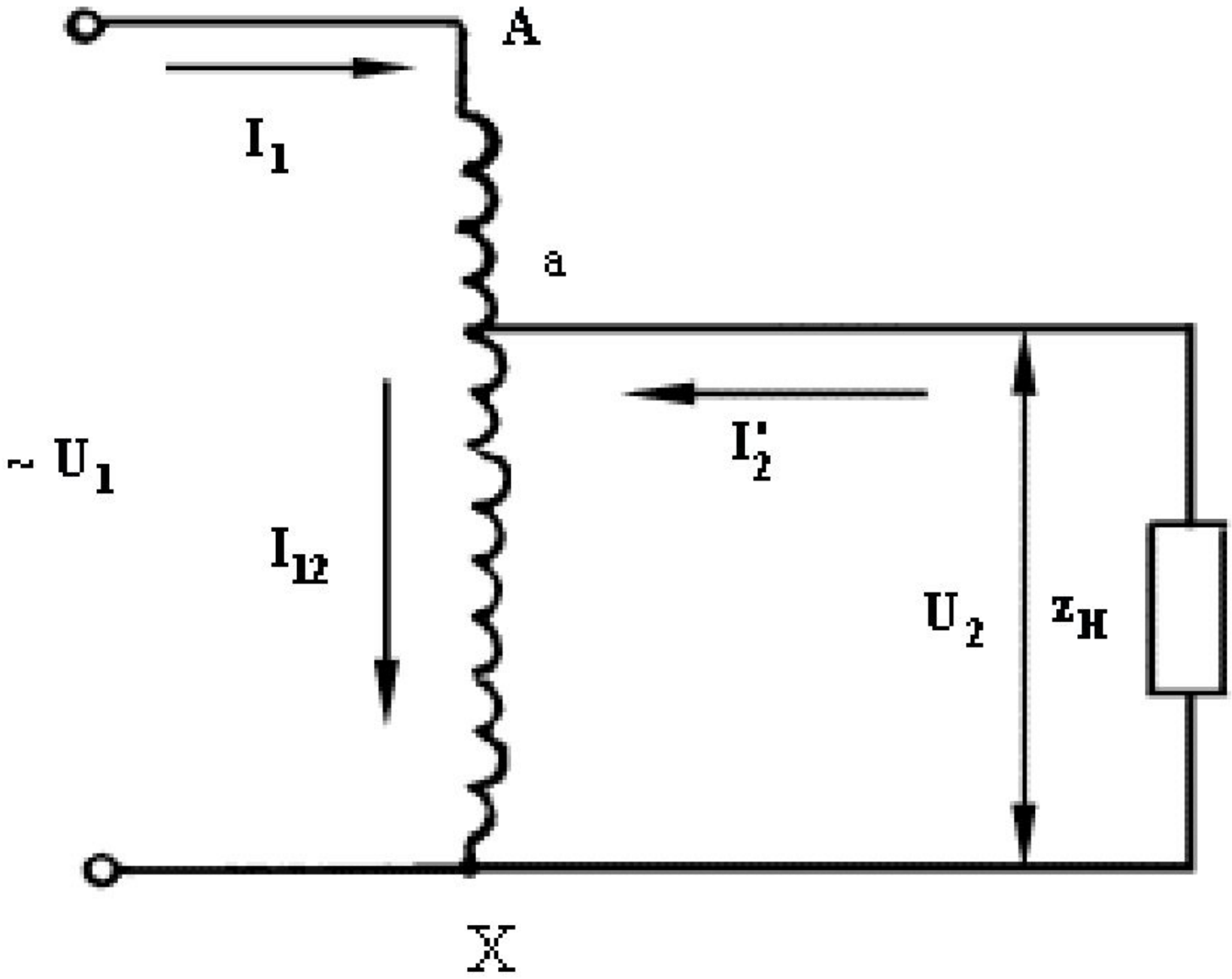
б)


η, %
100
80
60
40
20
0
ηмакс
10 20 30 40 50 60 70 80 90 100 P2, %


A
B
C
X
Y
Z
x
y
z
a
b
c

Внешнее напряжение	Низшее напряжение	Условное обозначение
		Y/Y₀
		Y/Δ 11
		Y/Δ 11
		Δ/Y 11


I1
~ U1
I2
U2
z2
I3
U3
z3


A
I_1
a
~ U_1
I_2'
I_{12}
U_2
$z_н$
X

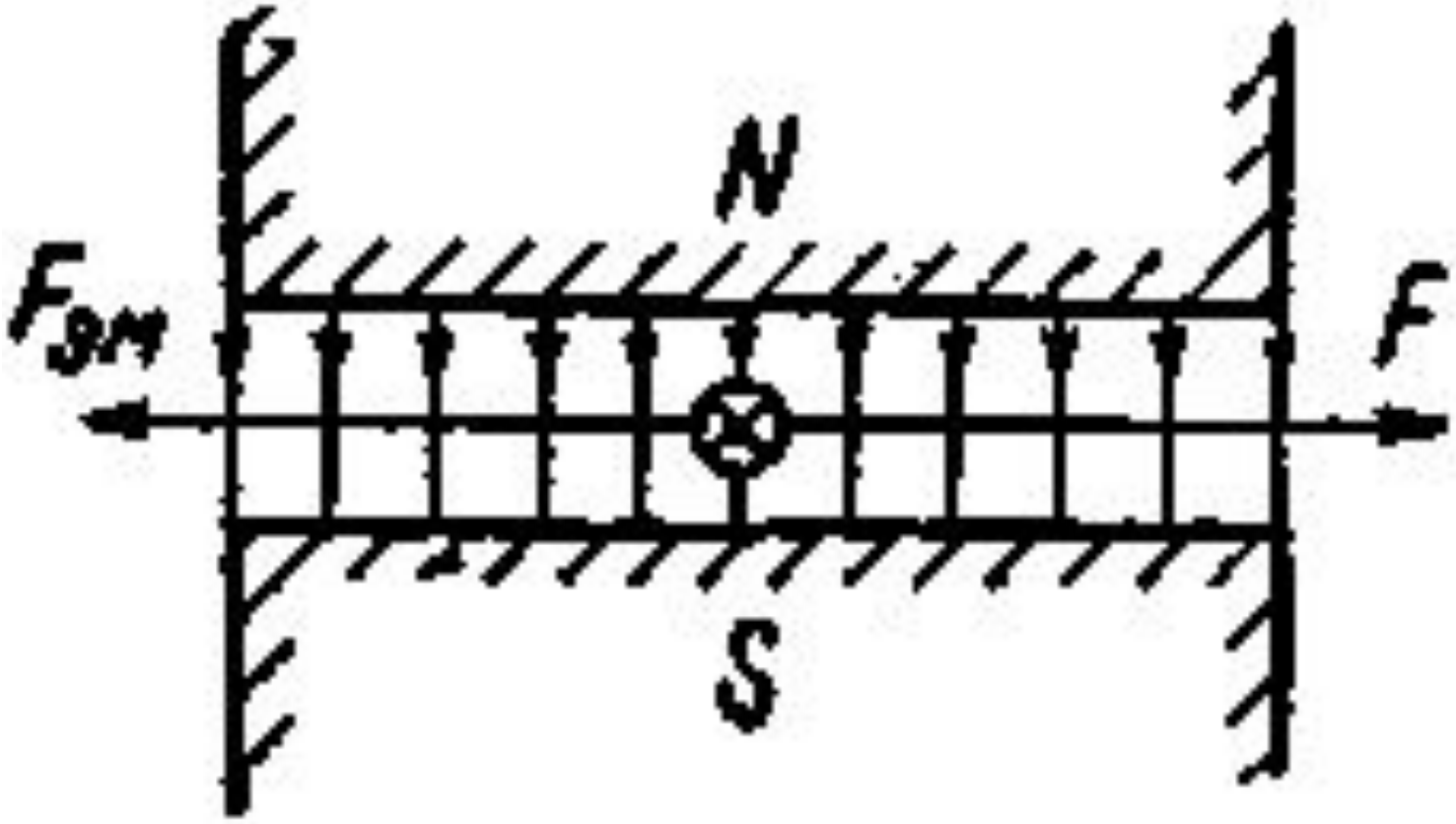


Рис. 1-2. К объяснению принципа действия электрических машин.

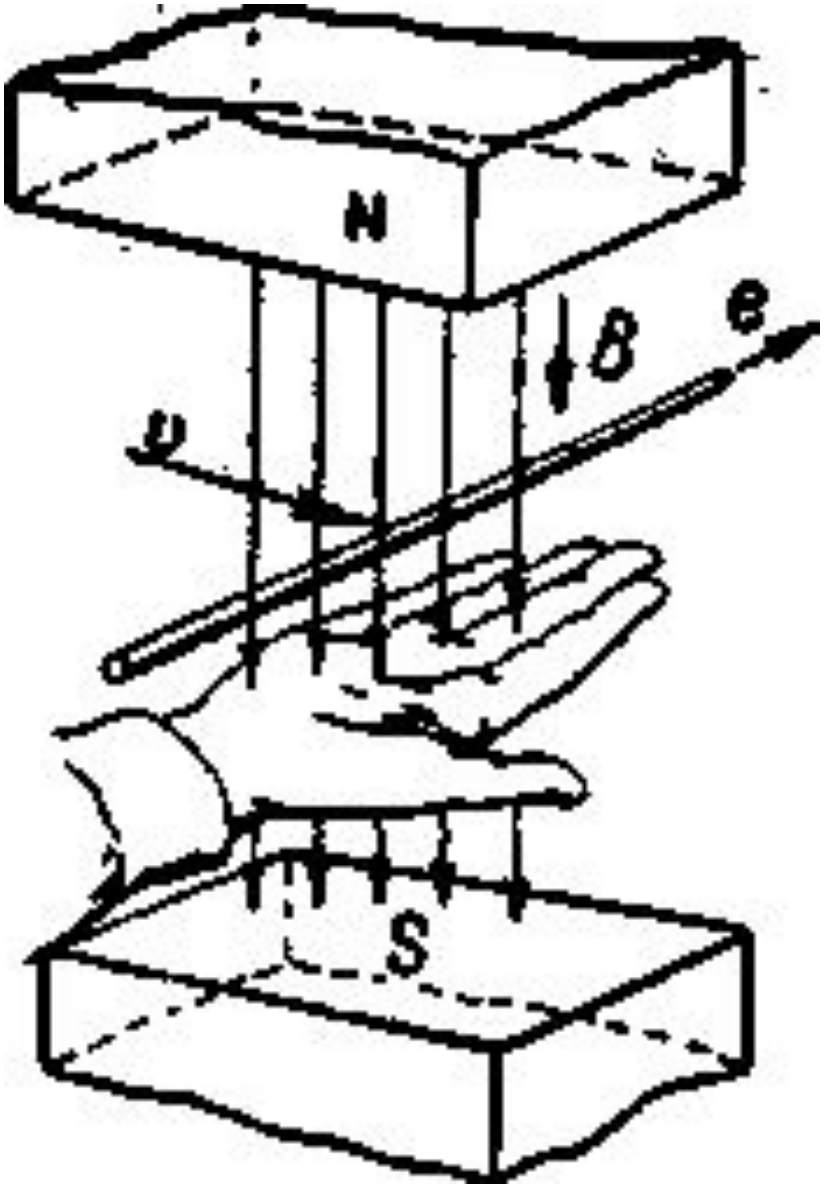


Рис. 1-3. Правило правой руки.

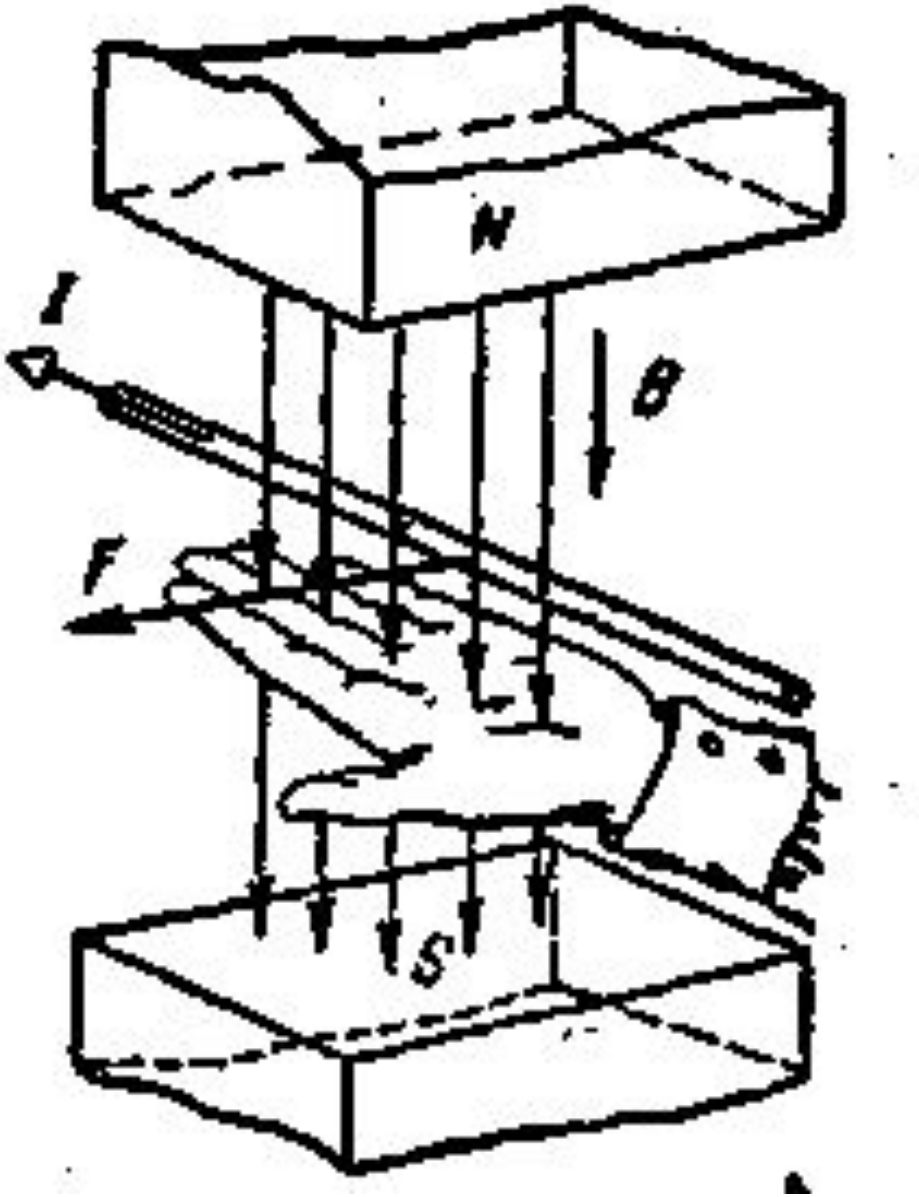
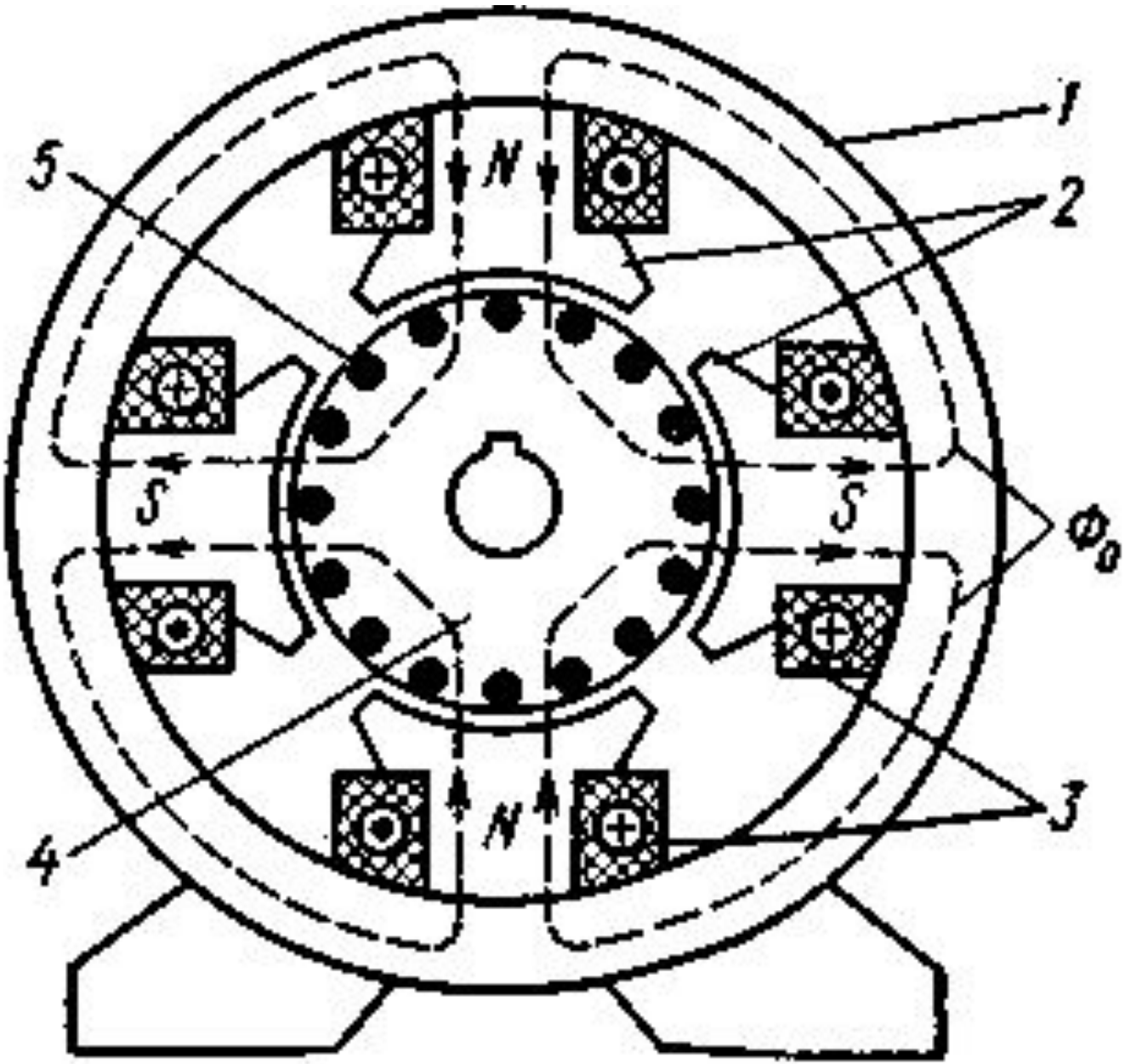
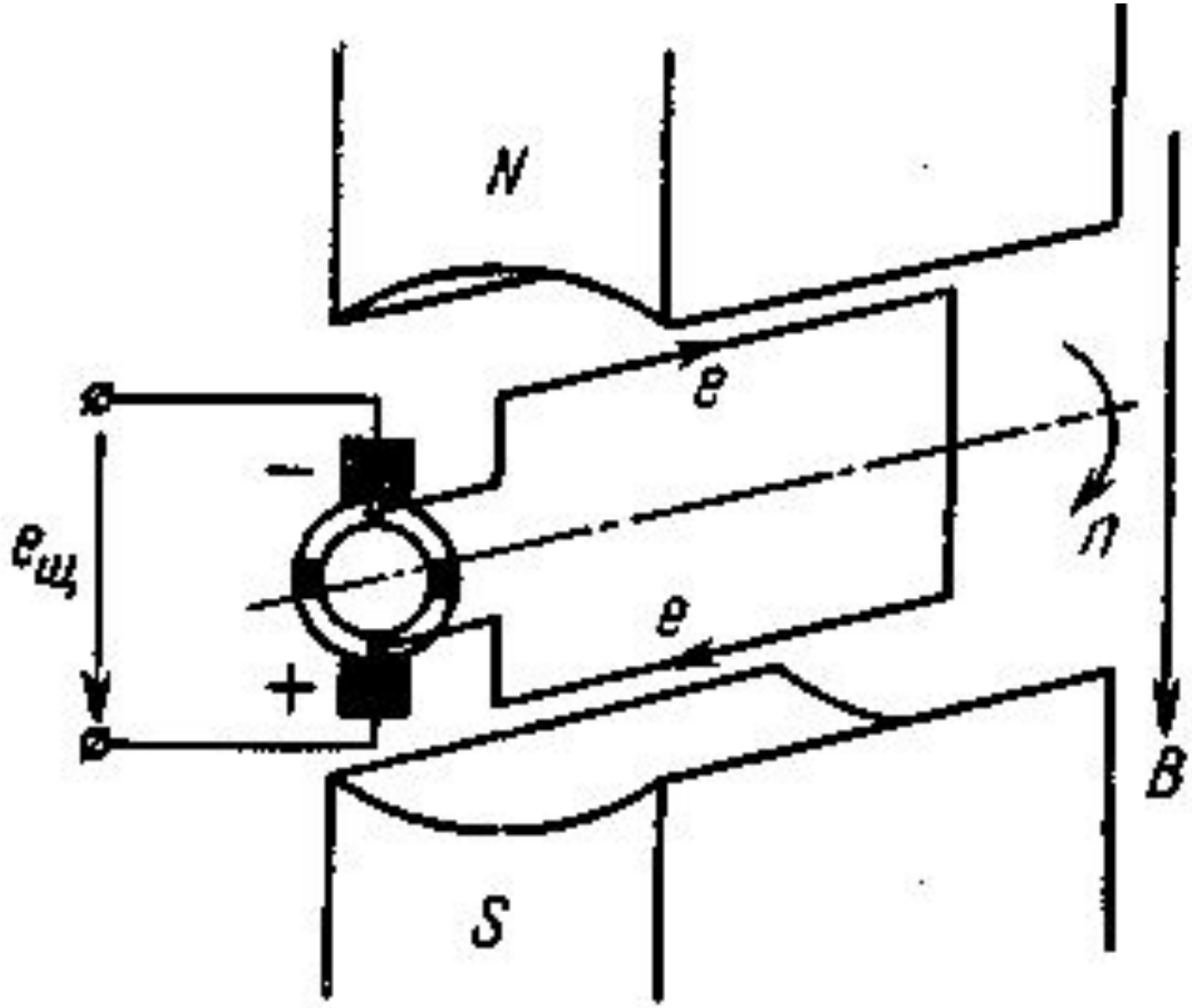


Рис. 1-4. Правило левой руки.


1
2
3
4
5
N
N
S
S
Φ0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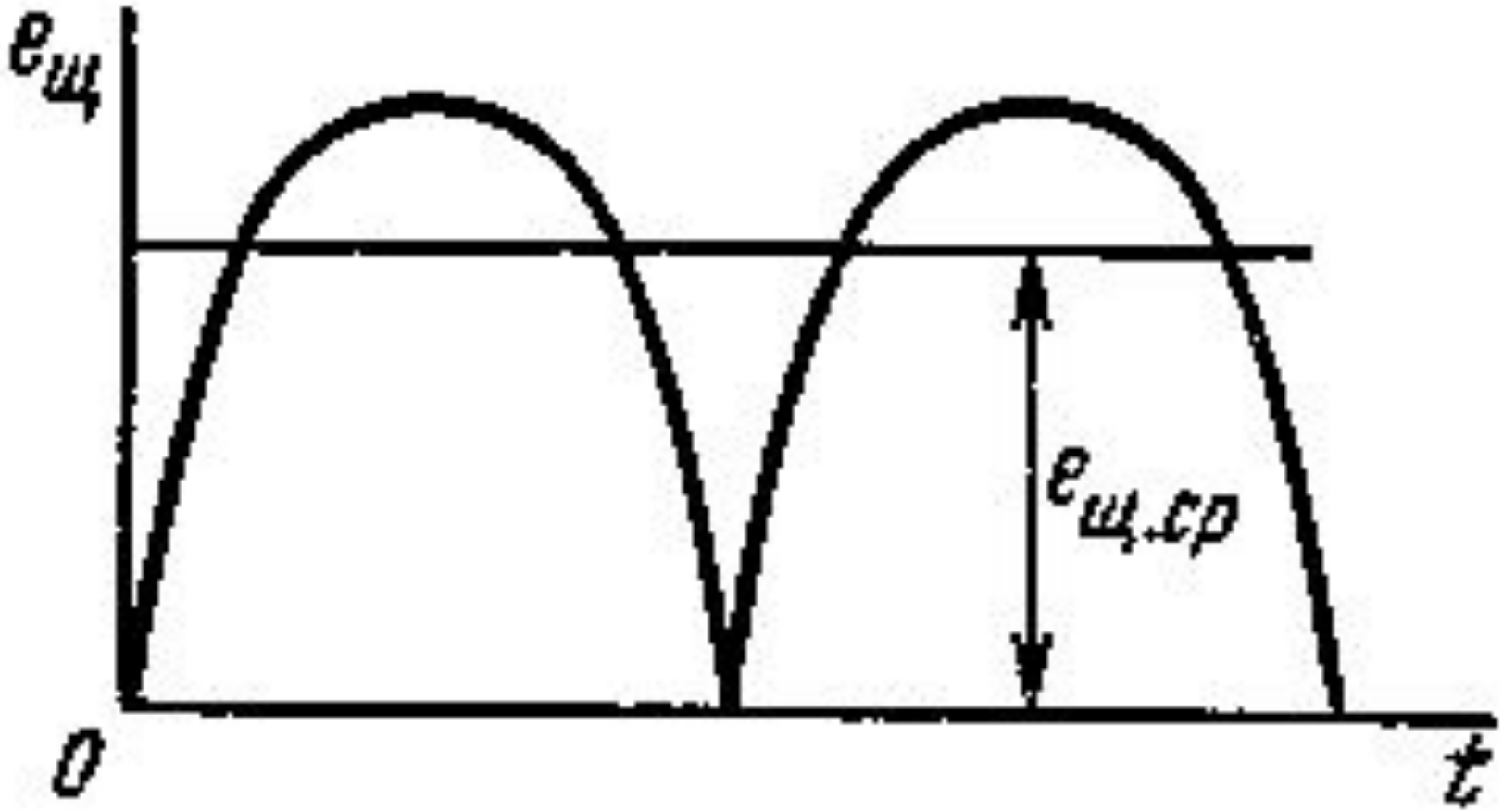
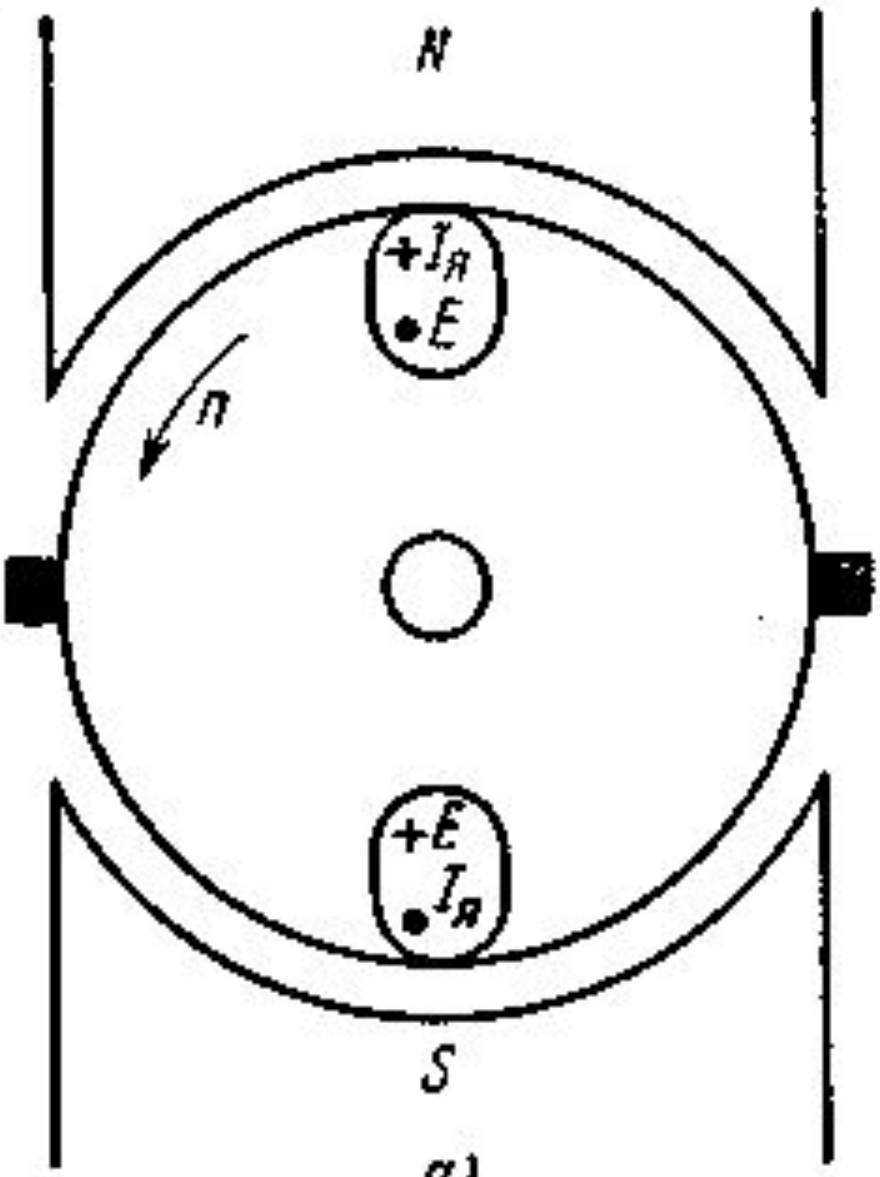
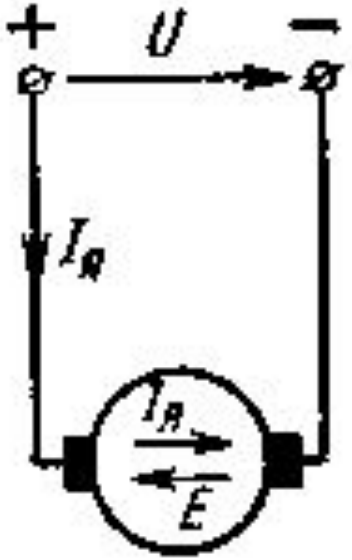
e
e
n
B
–
+
$e_щ$

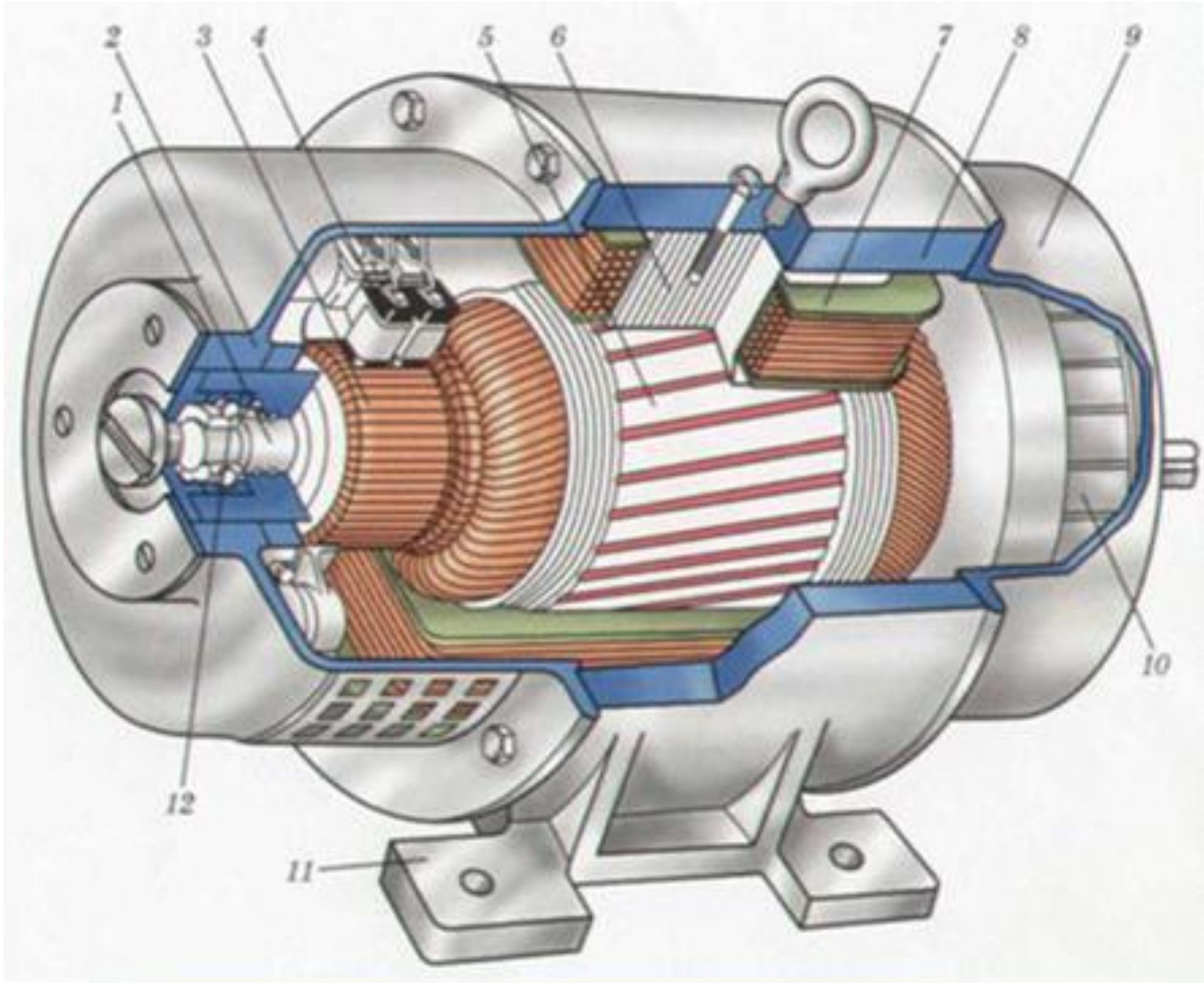

$e_ш$
$e_{ш.ср}$
0
t



а)



б)


1
2
3
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6
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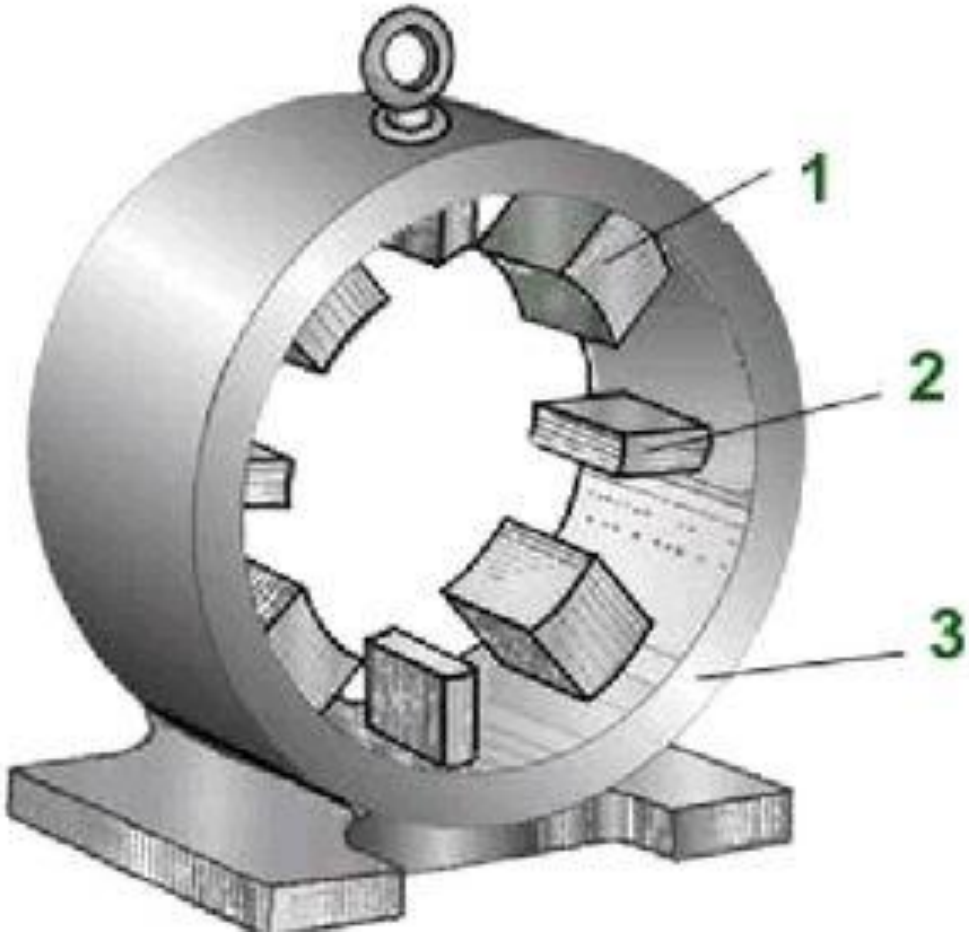
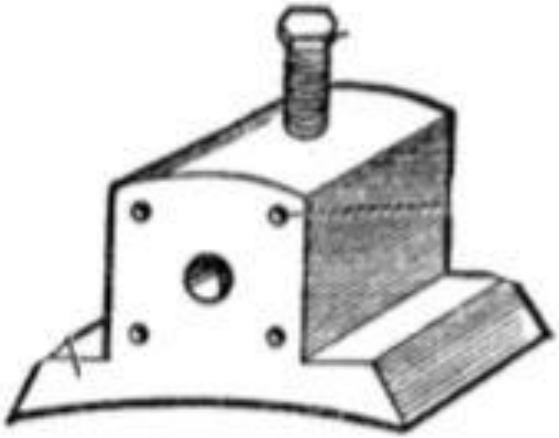
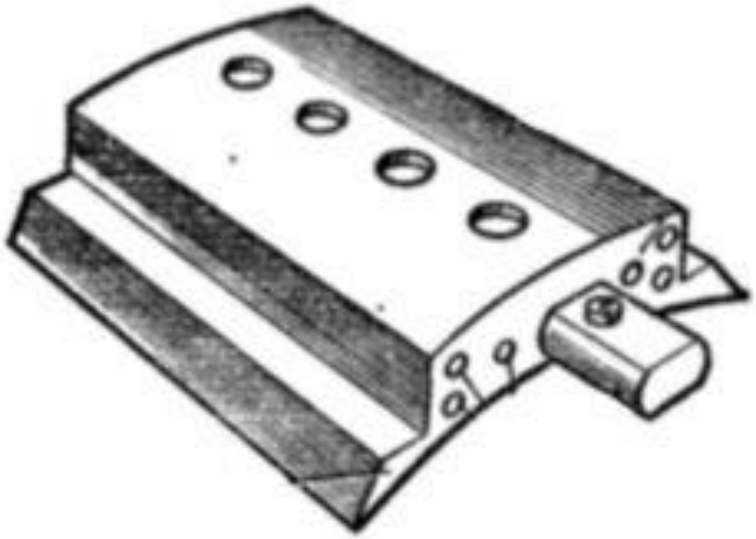
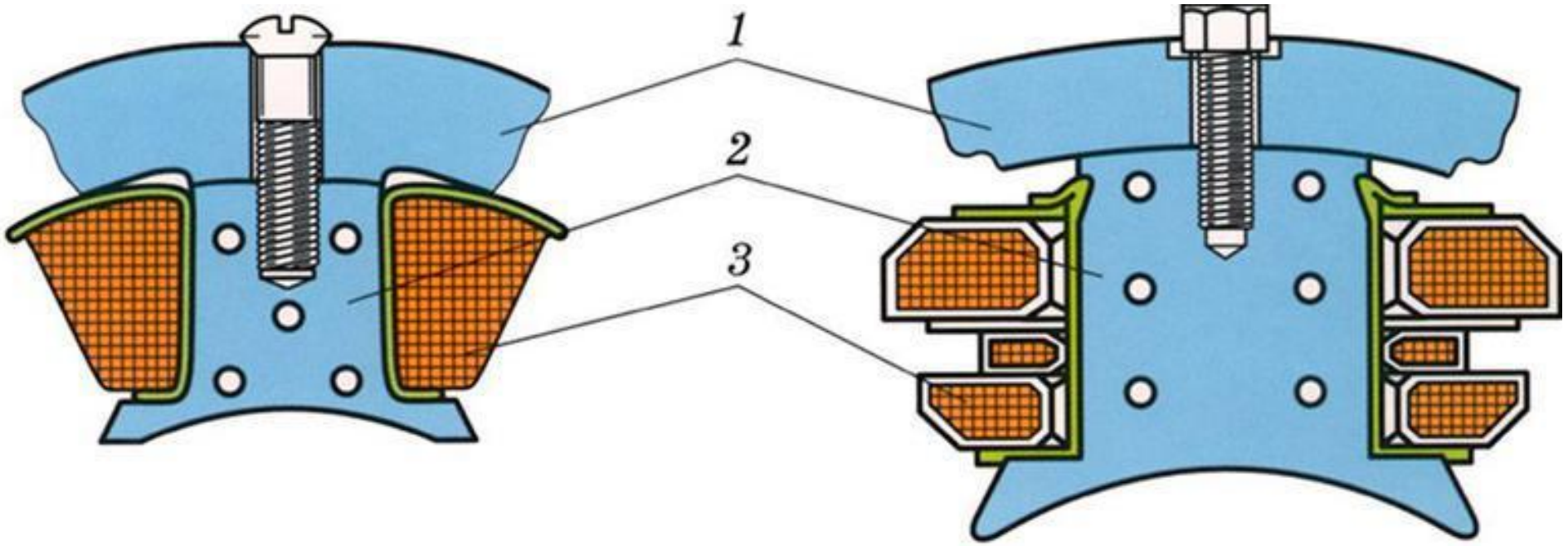
8
9
10
11
12

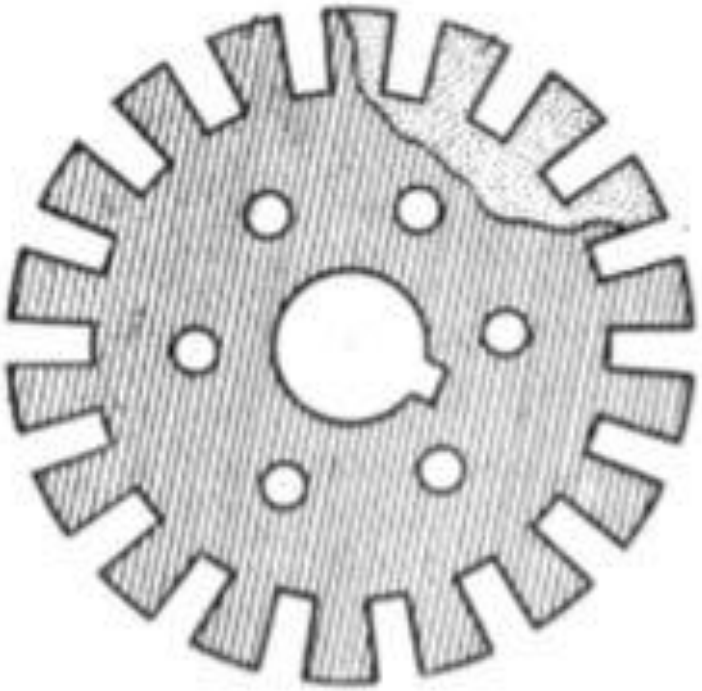


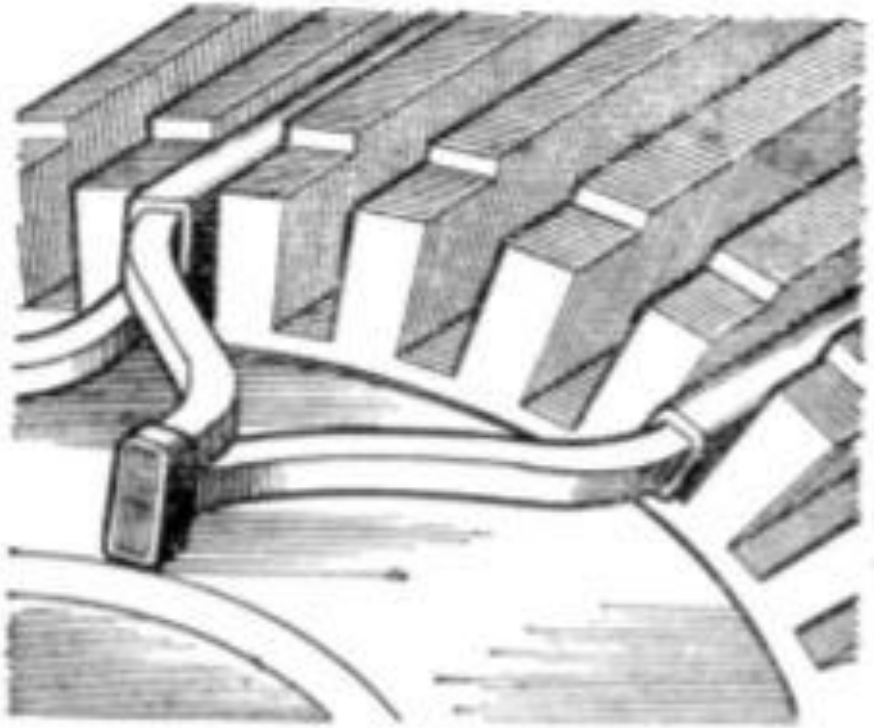
1 - главные полюсы,
2 - дополнительные полюсы,
3 - станина.

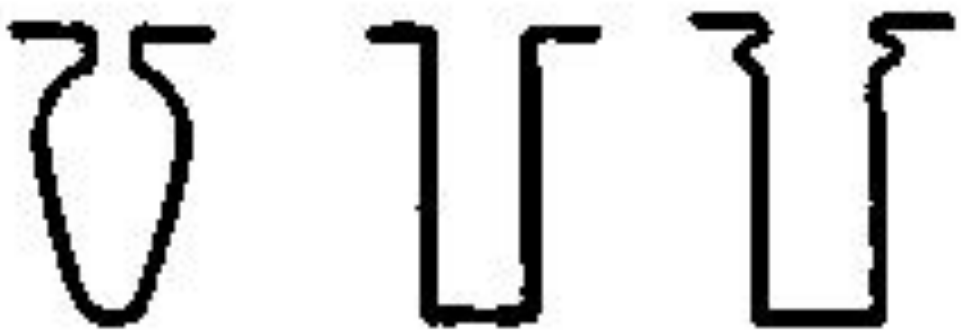


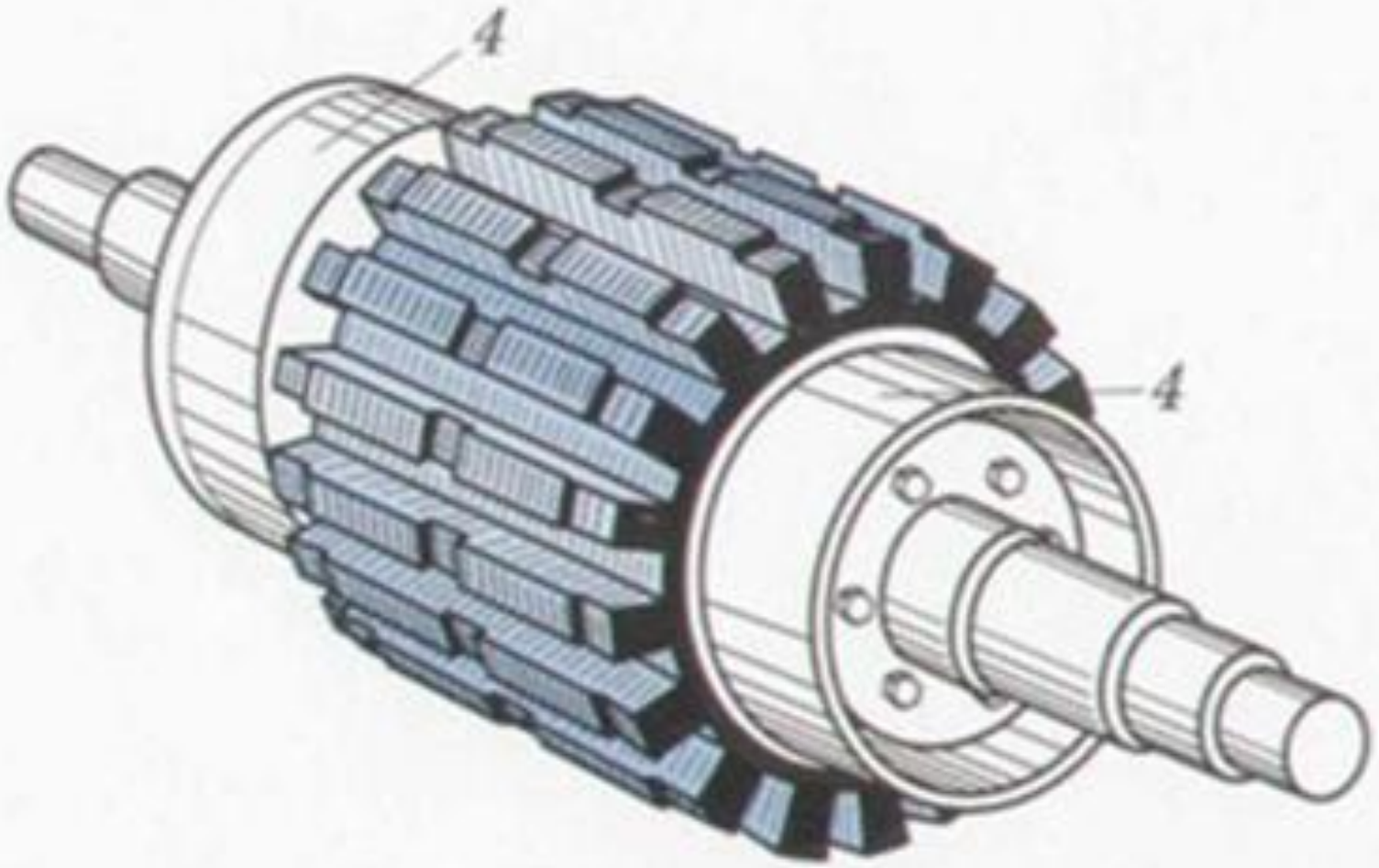



1
2
3

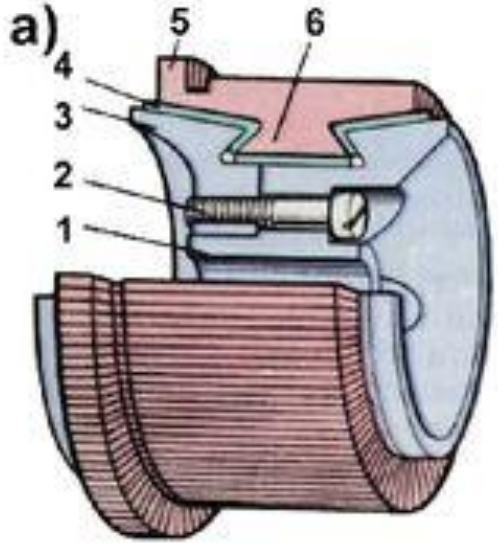




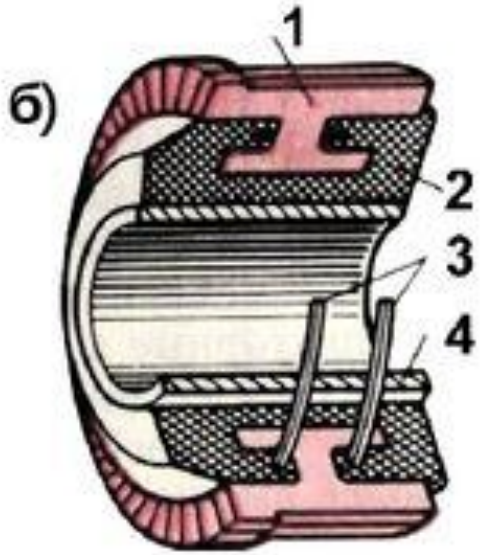




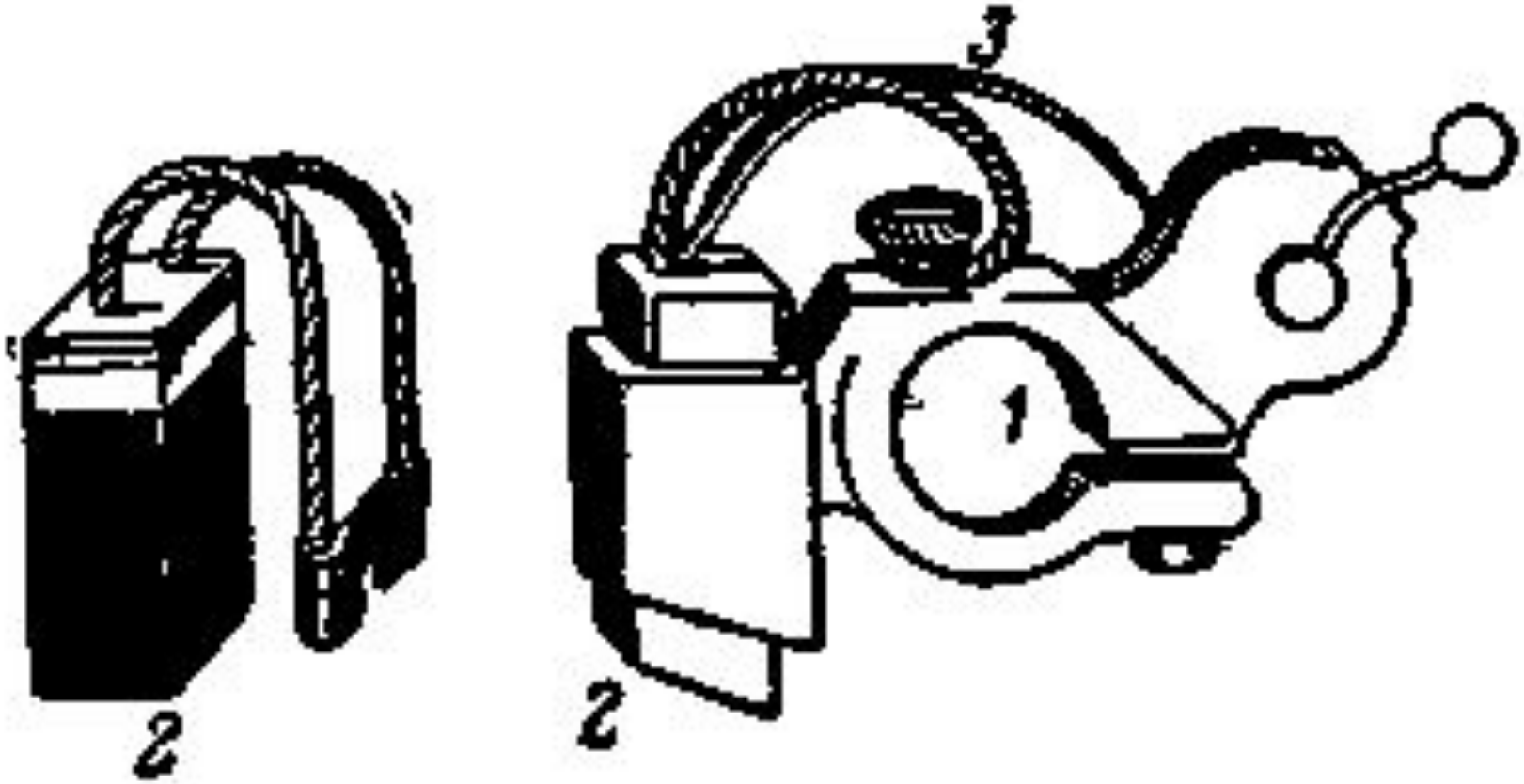
якорь без обмотки



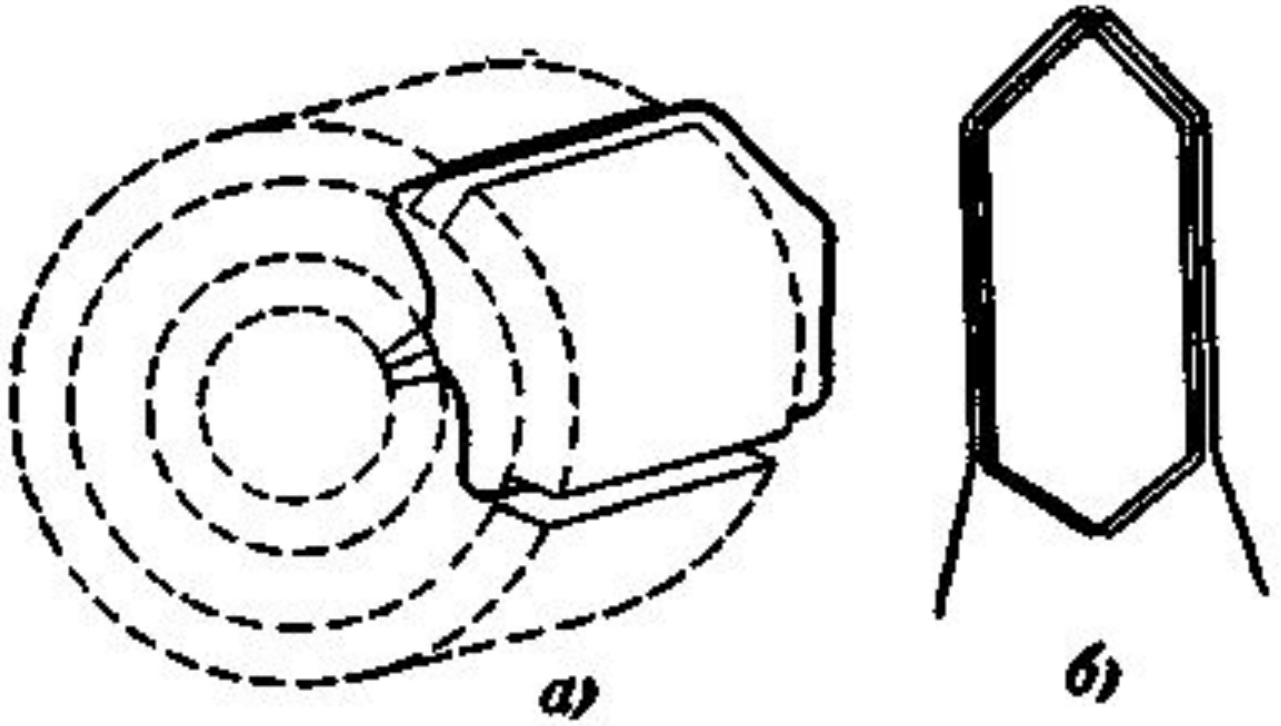
1,3 – конусные стальные шайбы.
2 – винты.
4 – микантовые прокладки.
5 – верхняя часть коллекторных пластин.
6 – нижняя часть коллекторных пластин.

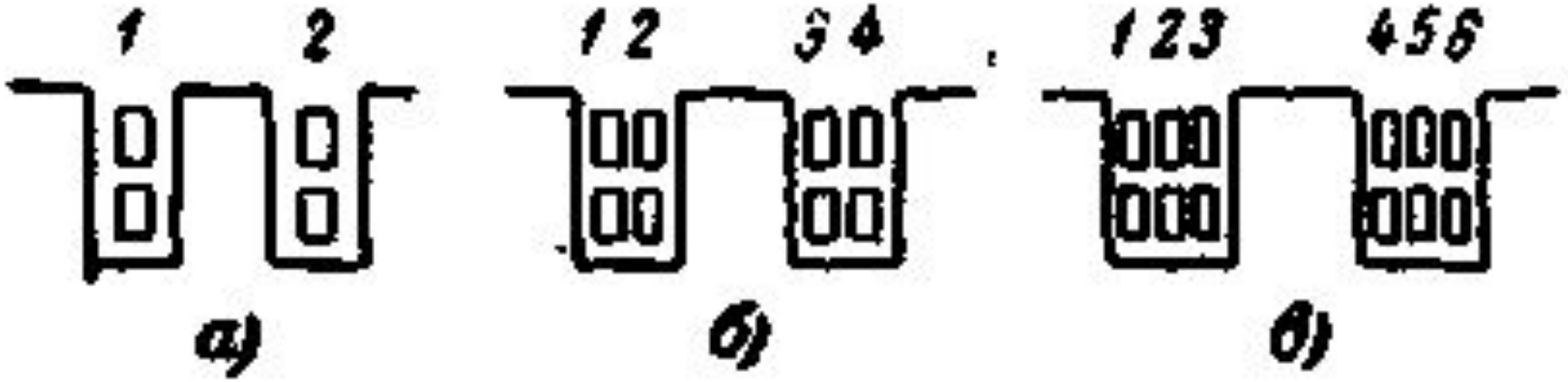


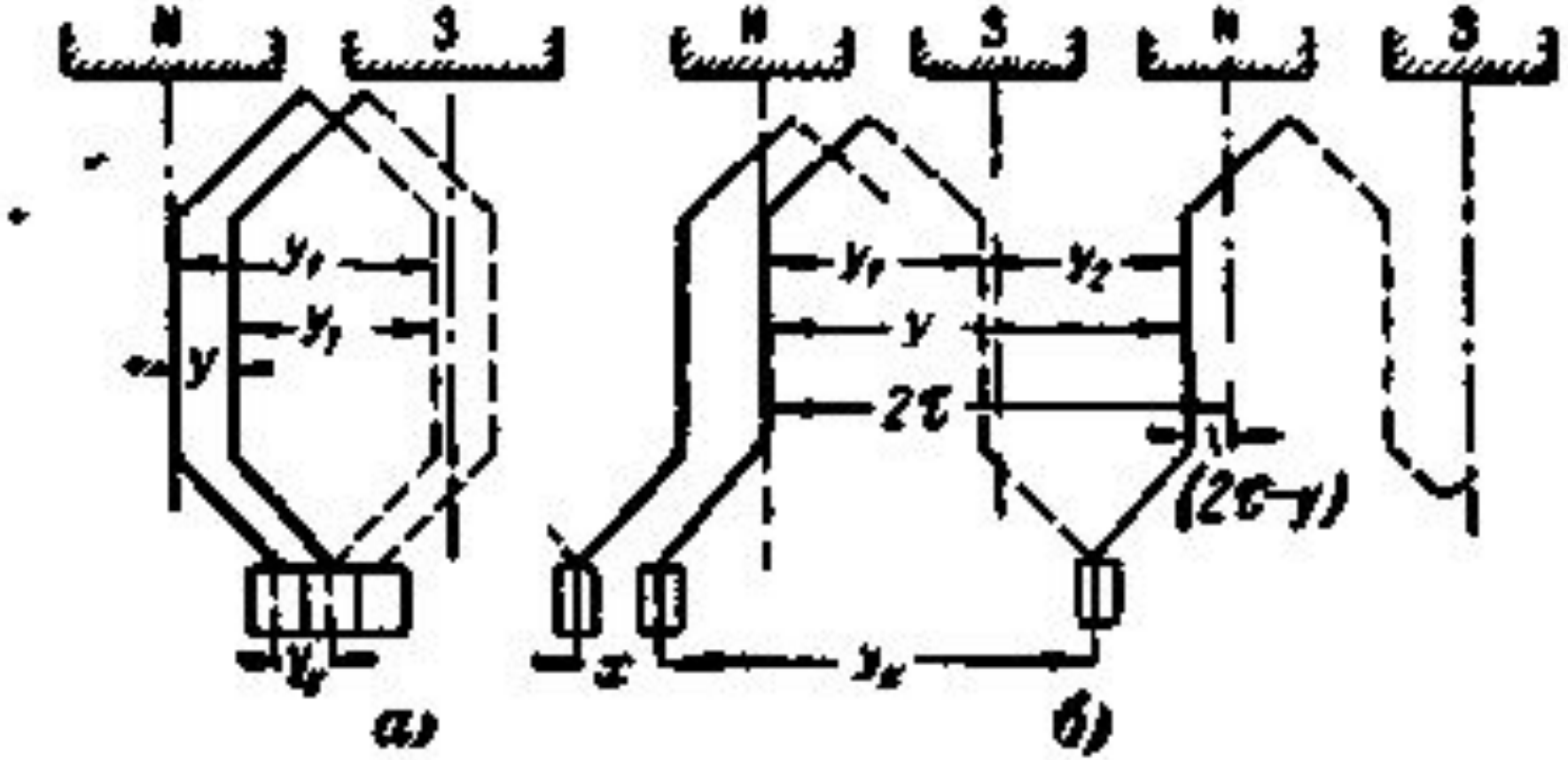
1 – набор пластин.
2 – пластмасса.
3 – армирующие стальные кольца.
4 – стальная втулка.

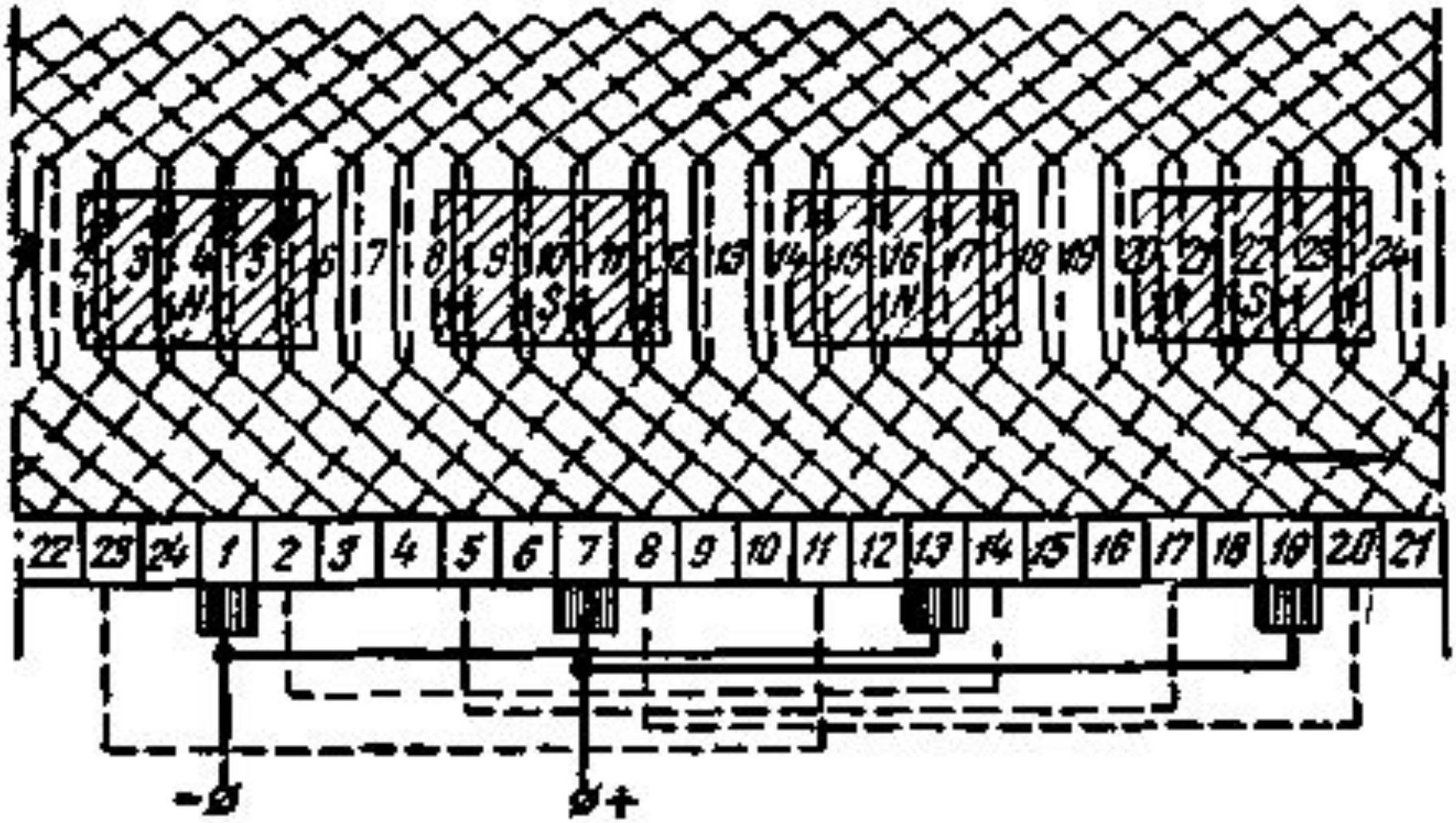

3
1
2
2

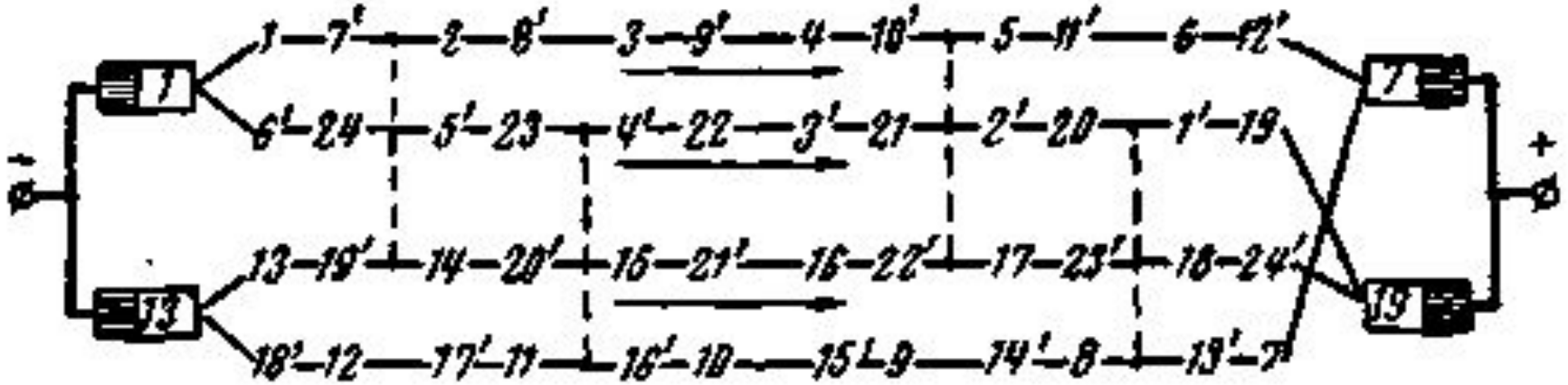

щеточный канатик
наконечник

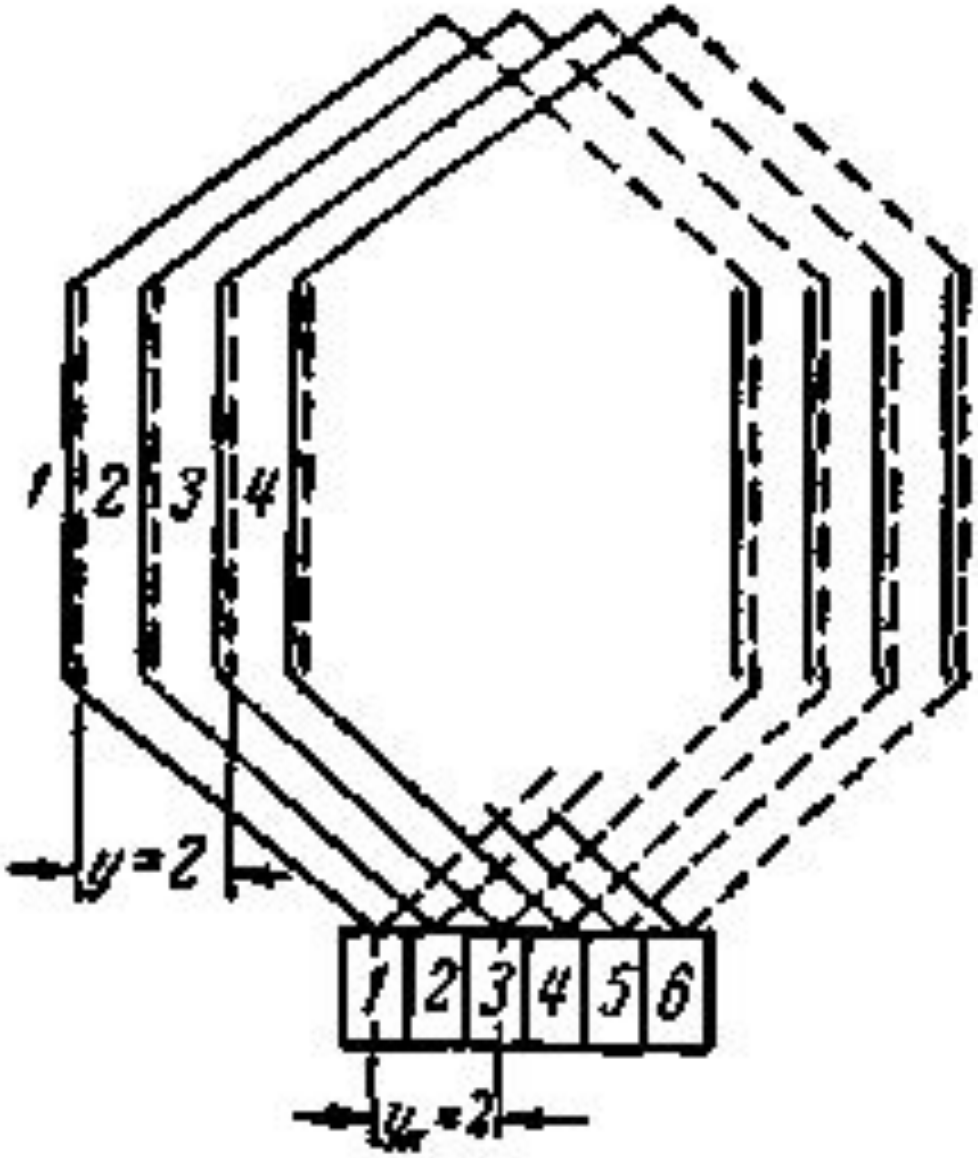

а)
б)

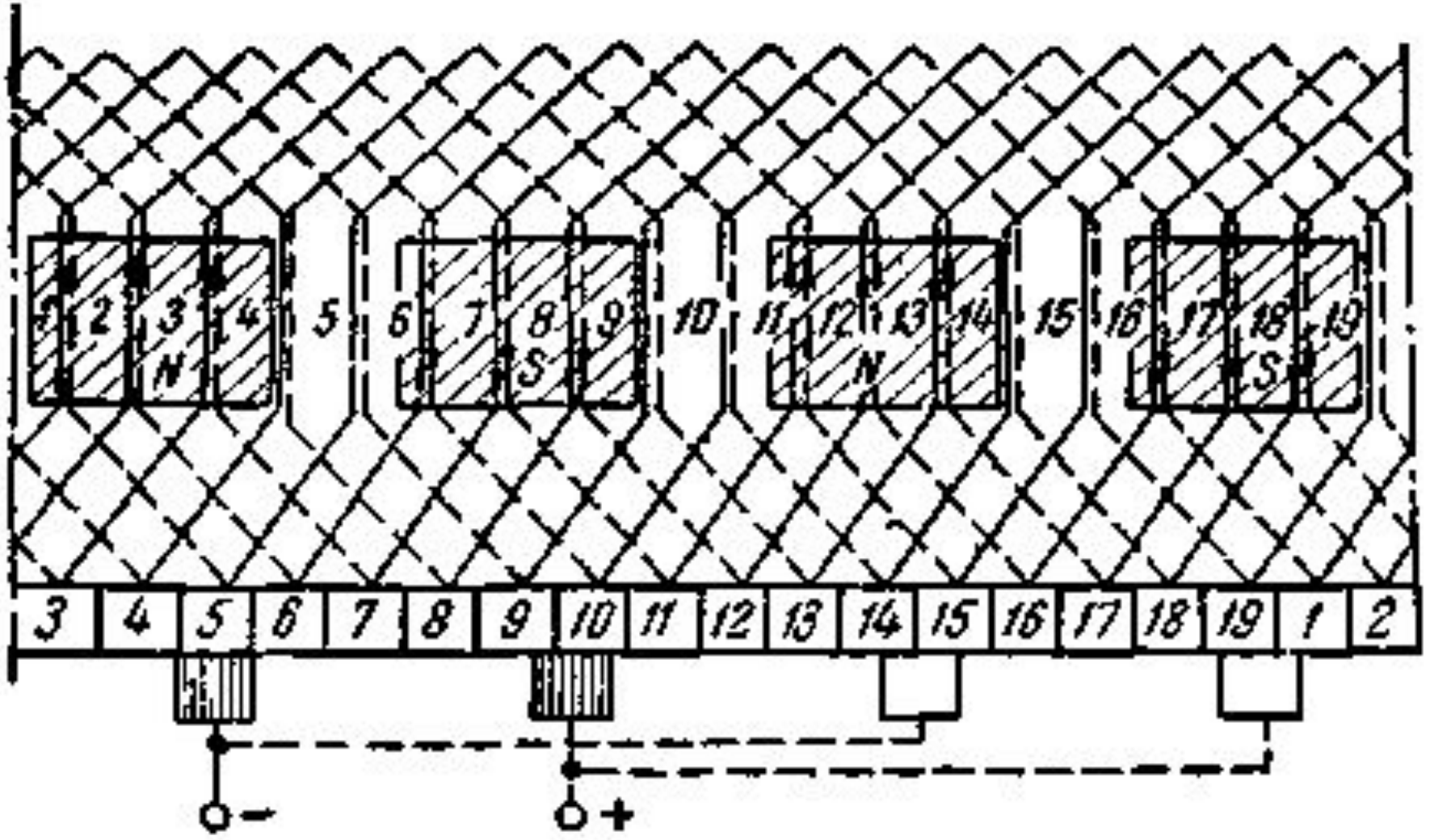

1
2
1 2
3 4
1 2 3
4 5 6
а)
б)
в)


N
S
N
S
N
S
y_1
y_1
y
y_2
y
2τ
$(2\tau-y)$
y_2
x
а)
б)


22 23 24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
-ø
ø+


1
13
7
19
1–7'
2–8'
3–9'
4–10'
5–11'
6–12'
6'–24
5'–23
4'–22
3'–21
2'–20
1'–19
13–19'
14–20'
15–21'
16–22'
17–23'
18–24'
18'–12
17'–11
16'–10
15–9
14'–8
13'–7
+


1
2
3
4
y=2
1
2
3
4
5
6
y=2


1
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N
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S
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11
12
13
N
14
15
16
17
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13
14
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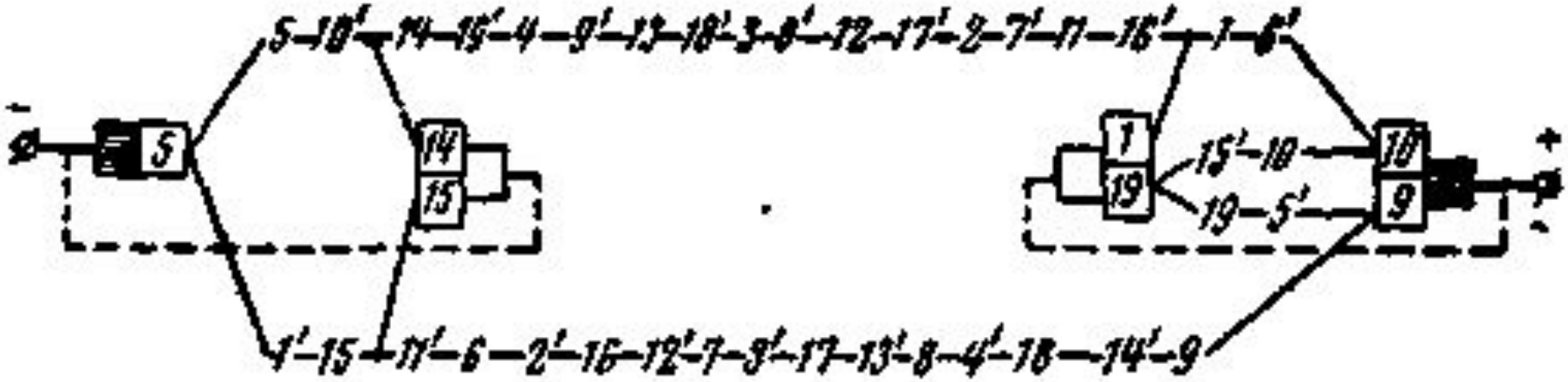
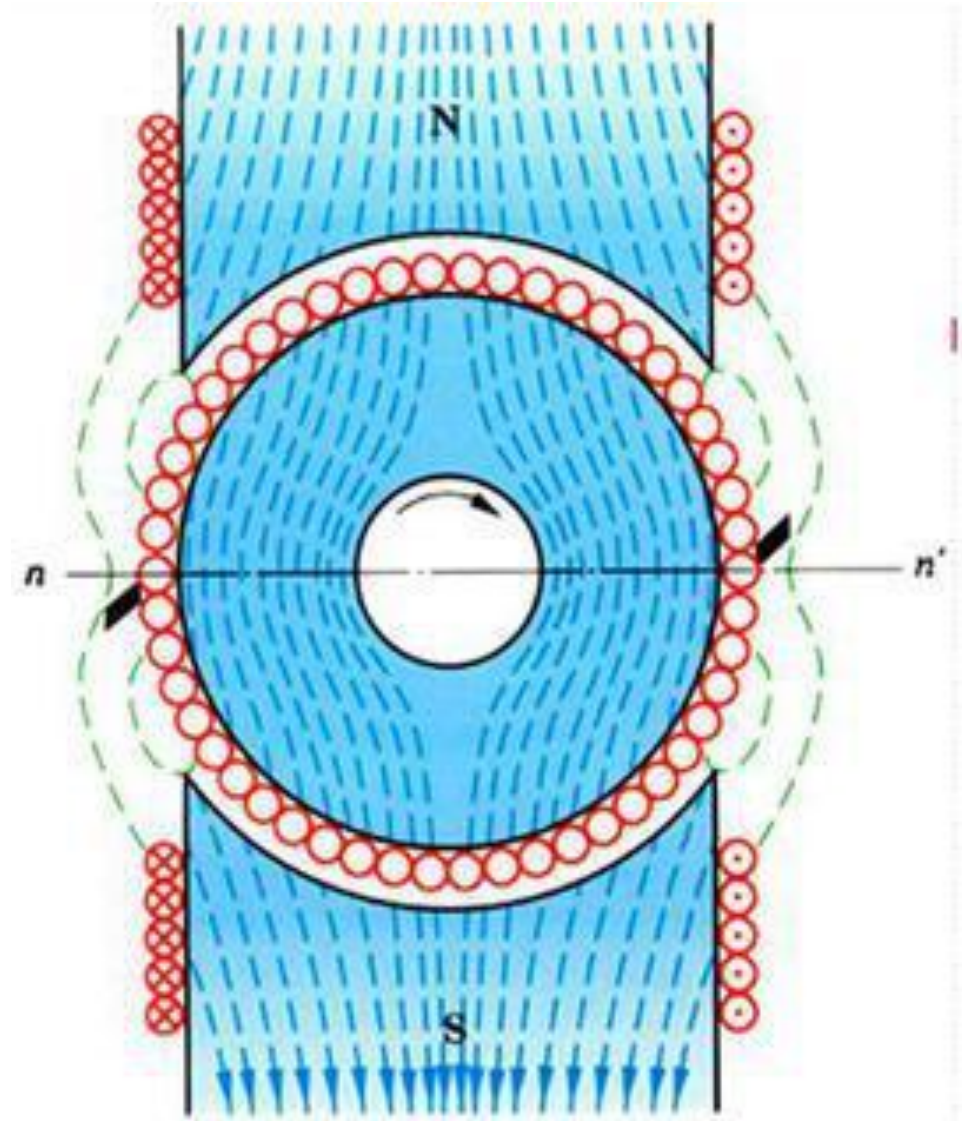
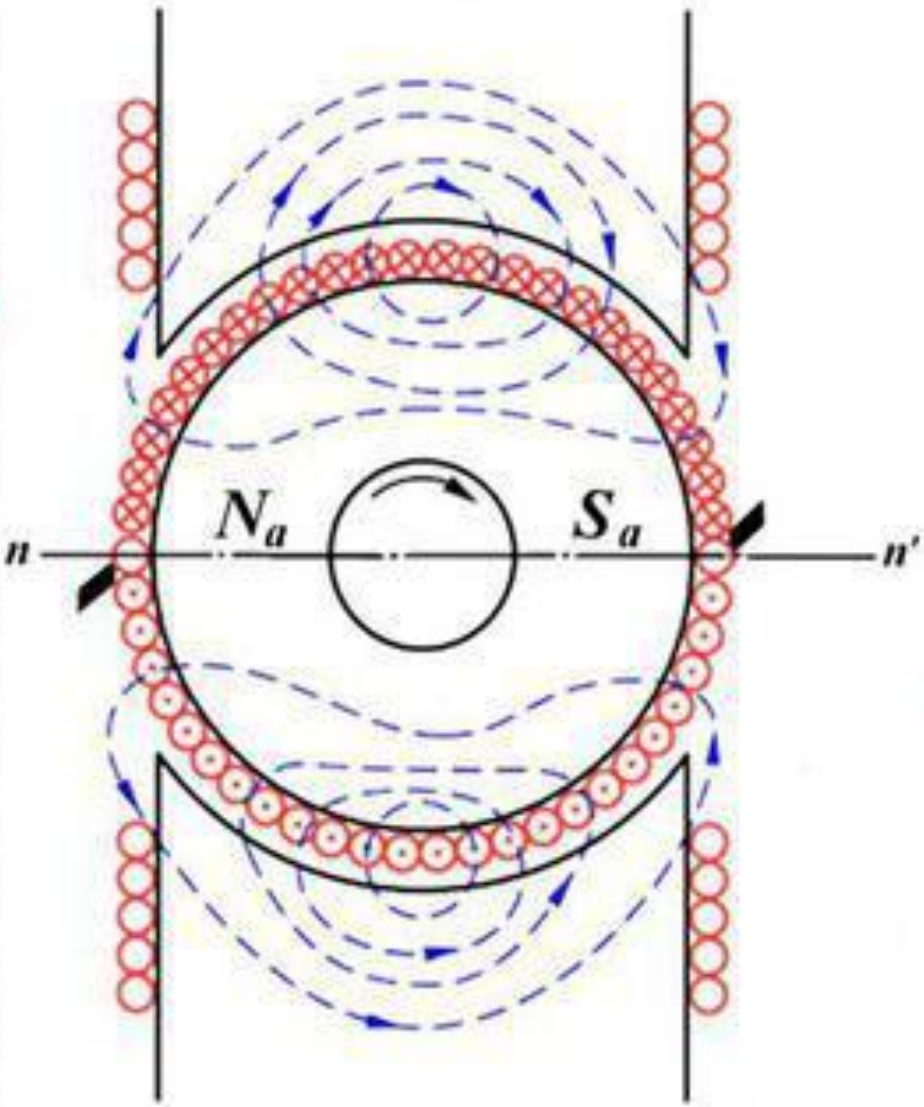
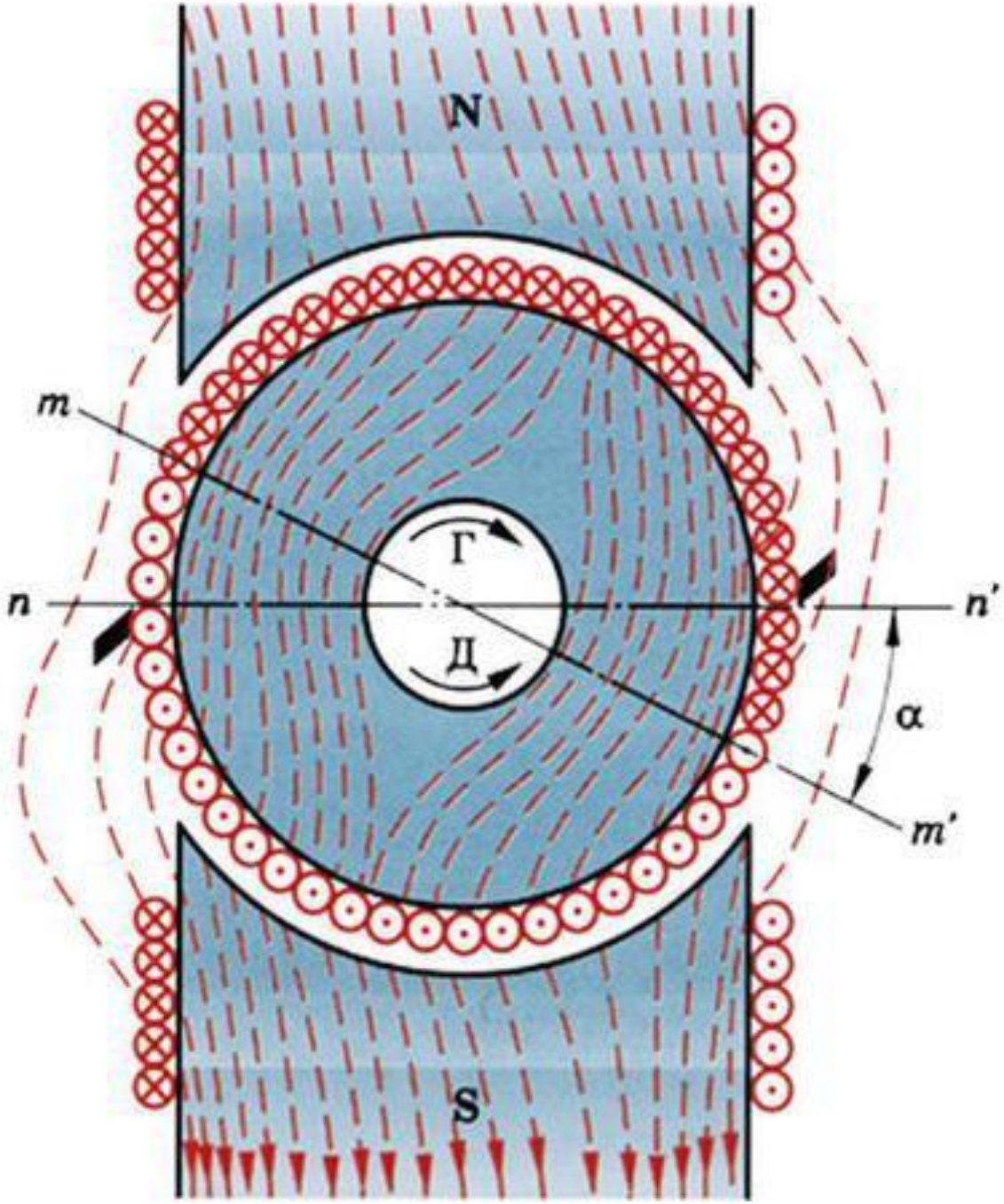
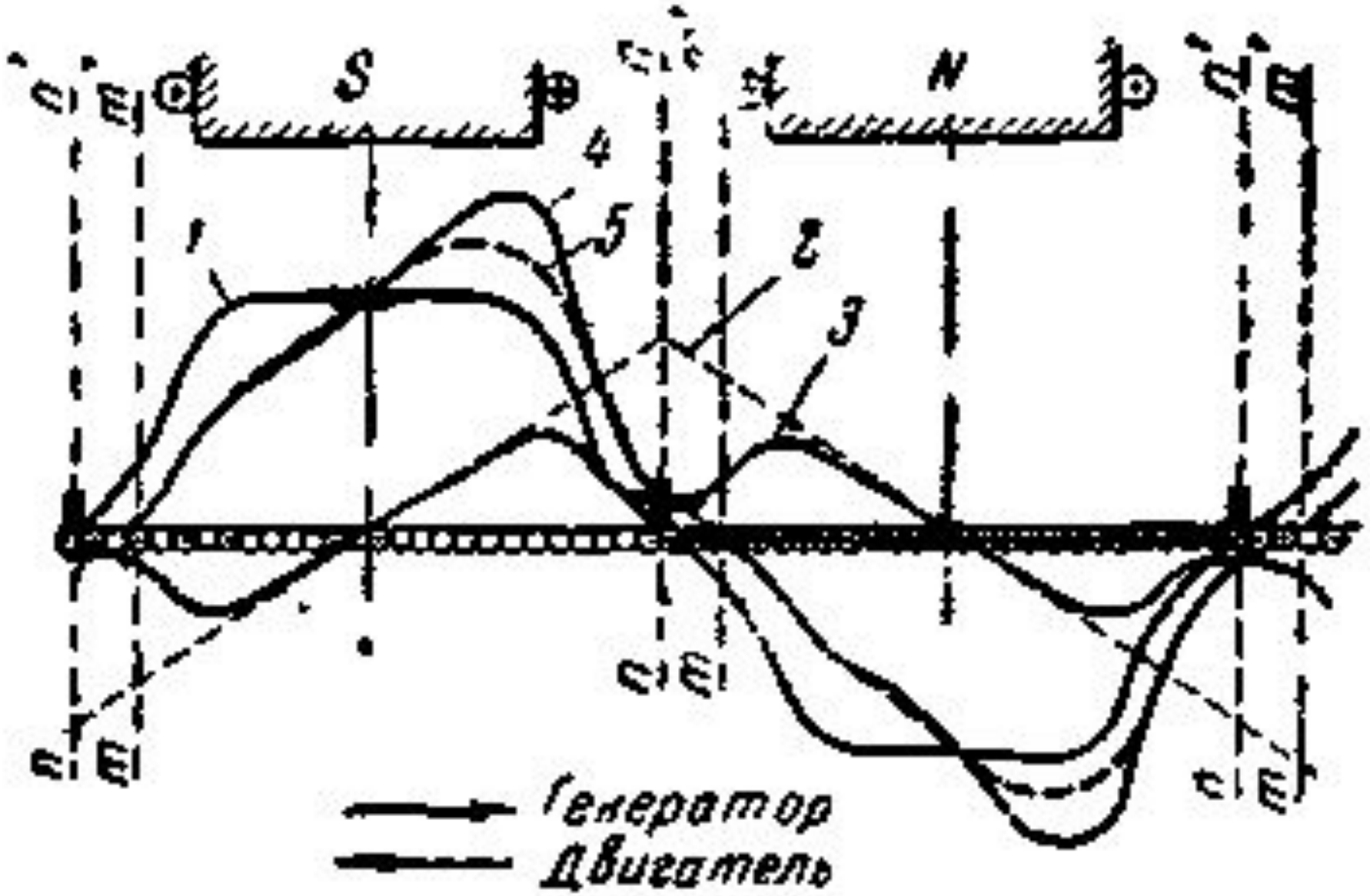
18
19
1
2
−
+

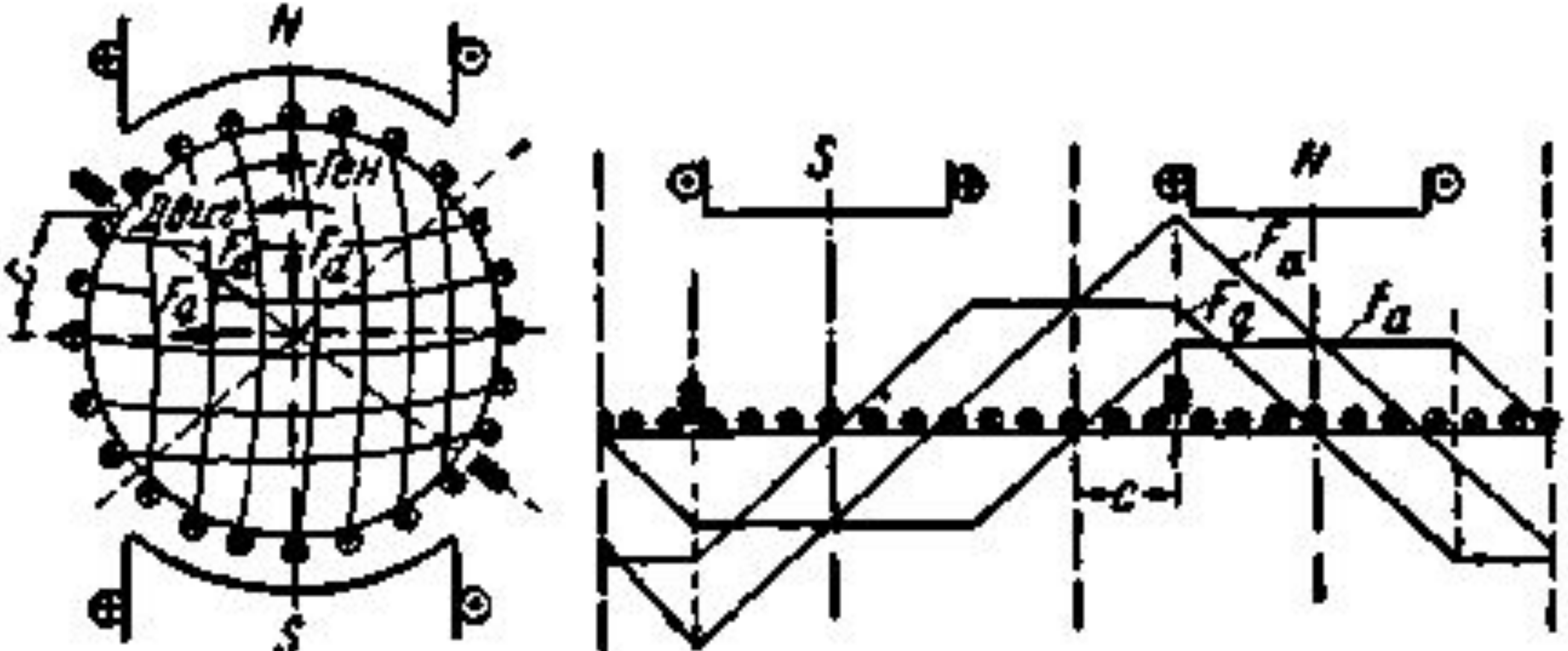

5-18'-14-15'-4-9'-13-18'-3-8'-12-17'-2-7'-11-16'-1-6'
1'-15-11'-6-2'-16-12'-7-3'-17-13'-8-4'-18-14'-9
5
14
15
1
19
15'-10
19-5'
10
9


N
S
n
n'

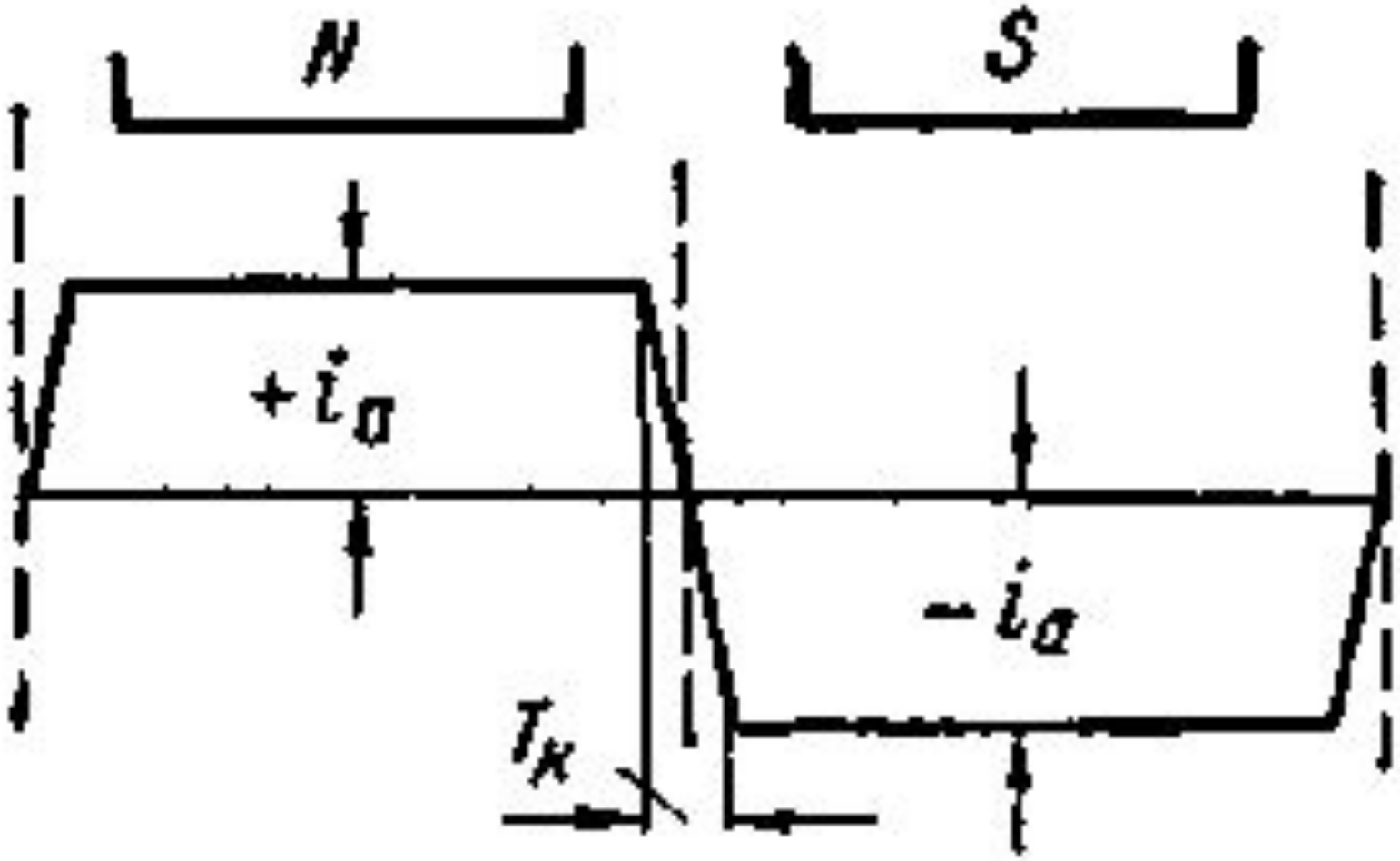

N_a
S_a
n
n'

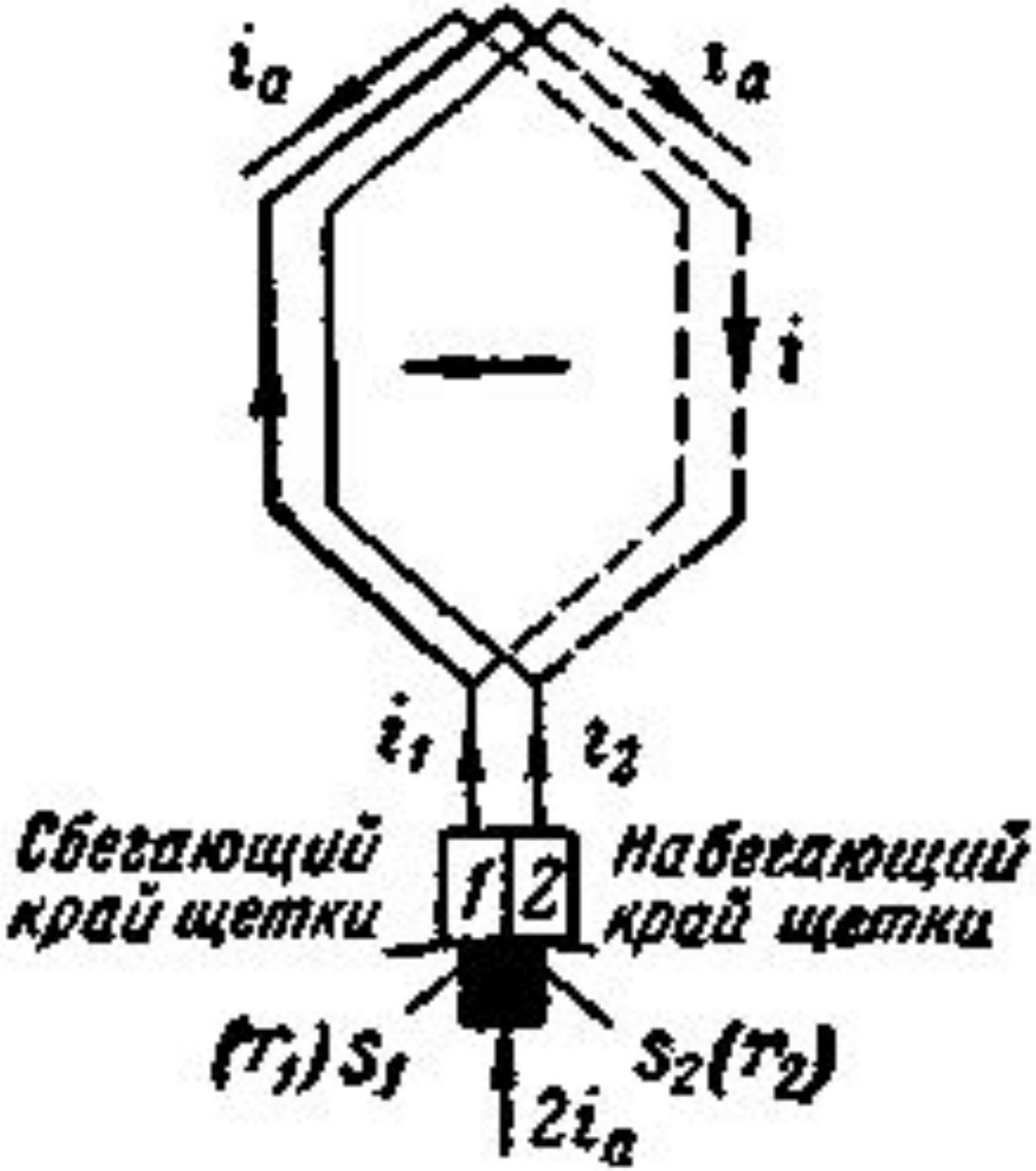

N
m
Г
n
n'
Д
α
m'
S

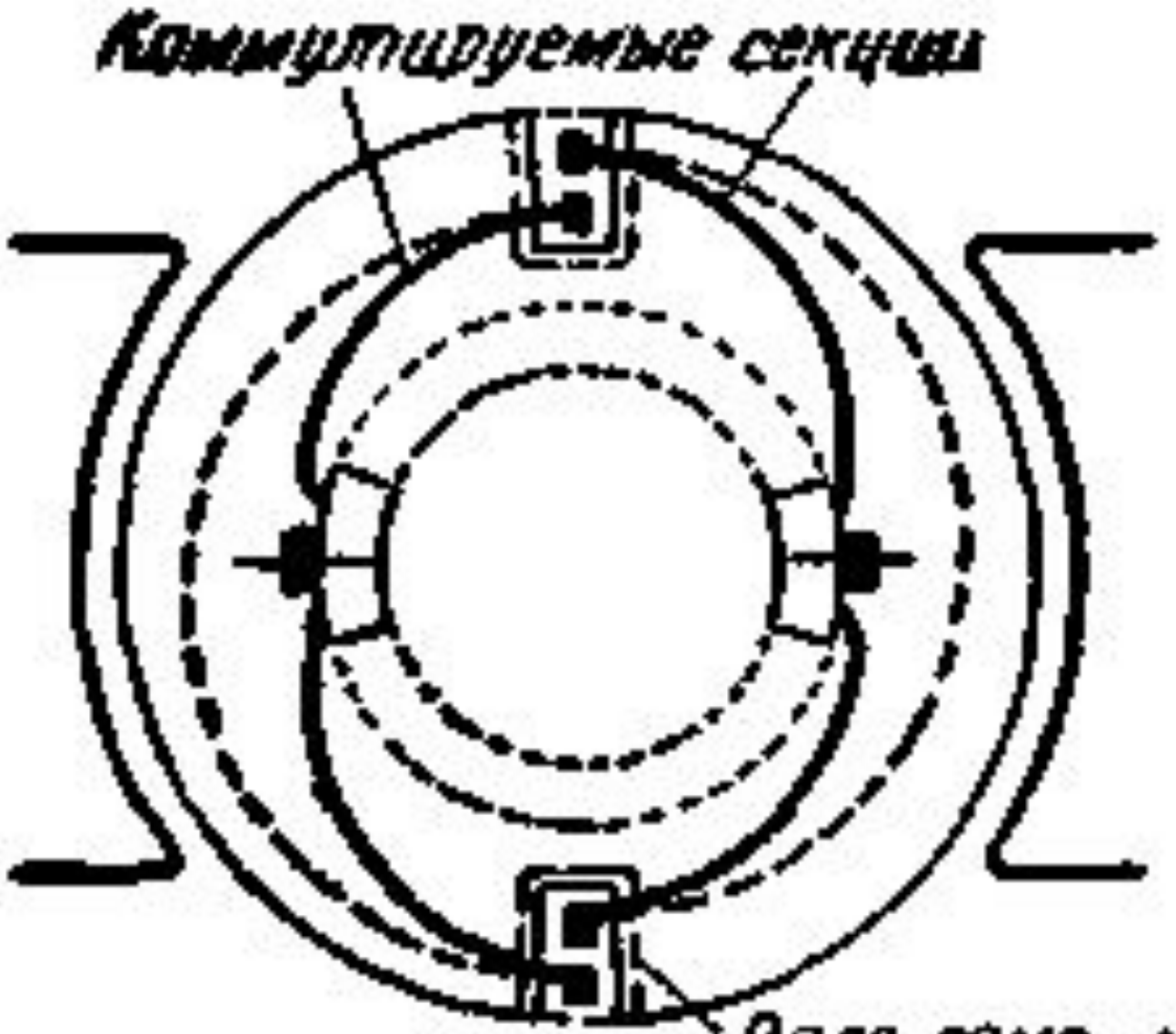

S
N
1
2
3
4
5
Генератор
Двигатель

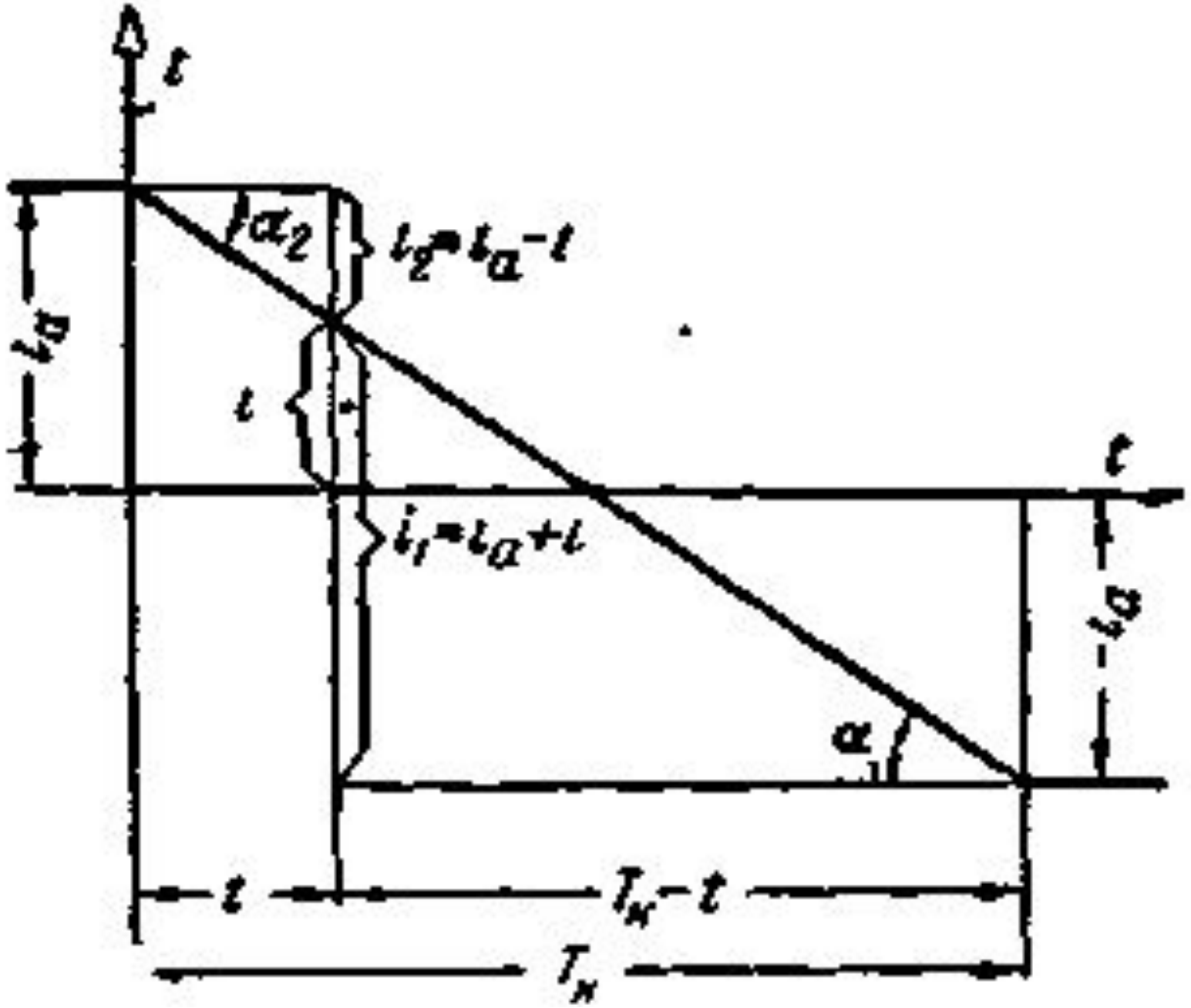


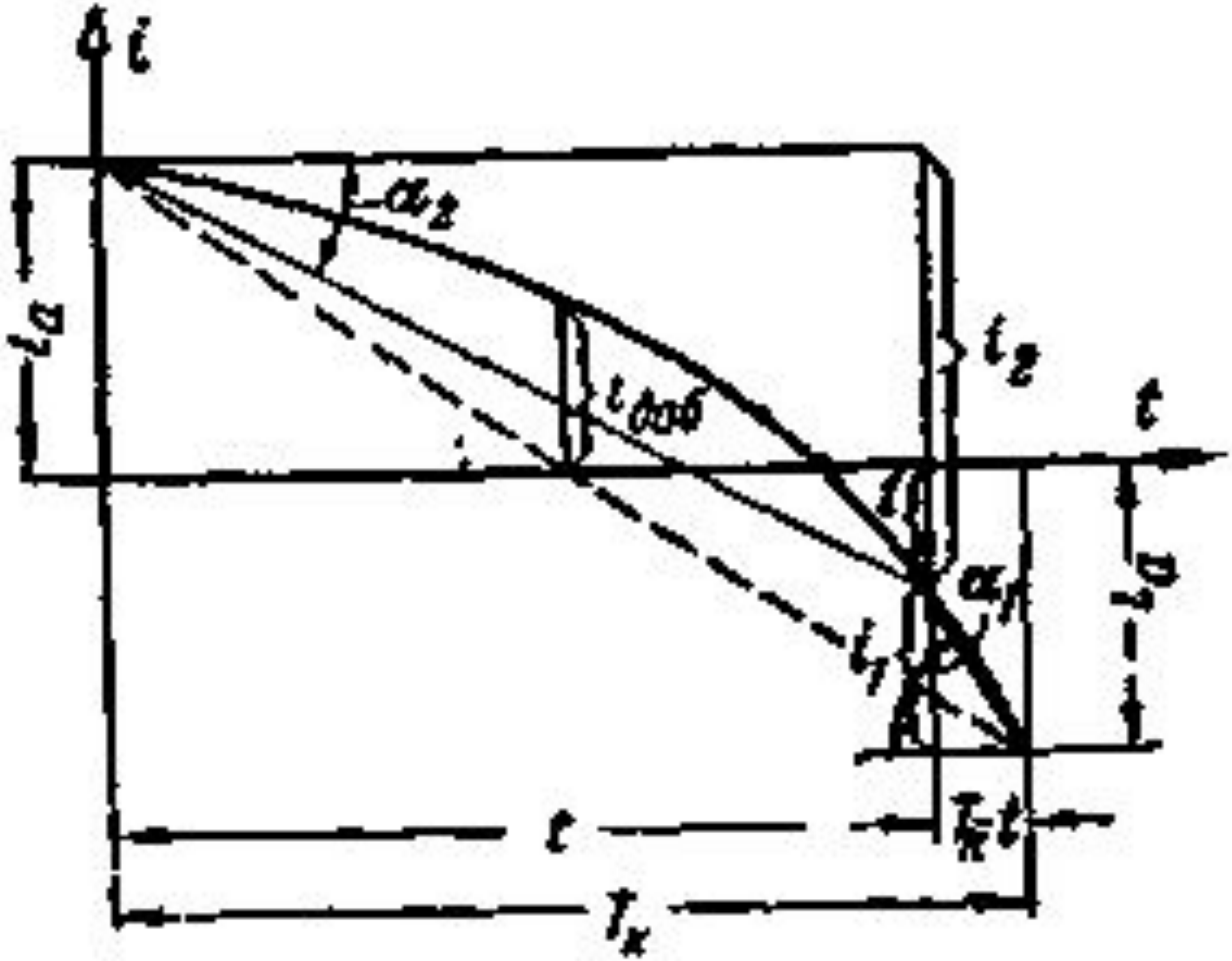
а) б)


N
S
$+i_a$
$-i_a$
T_k

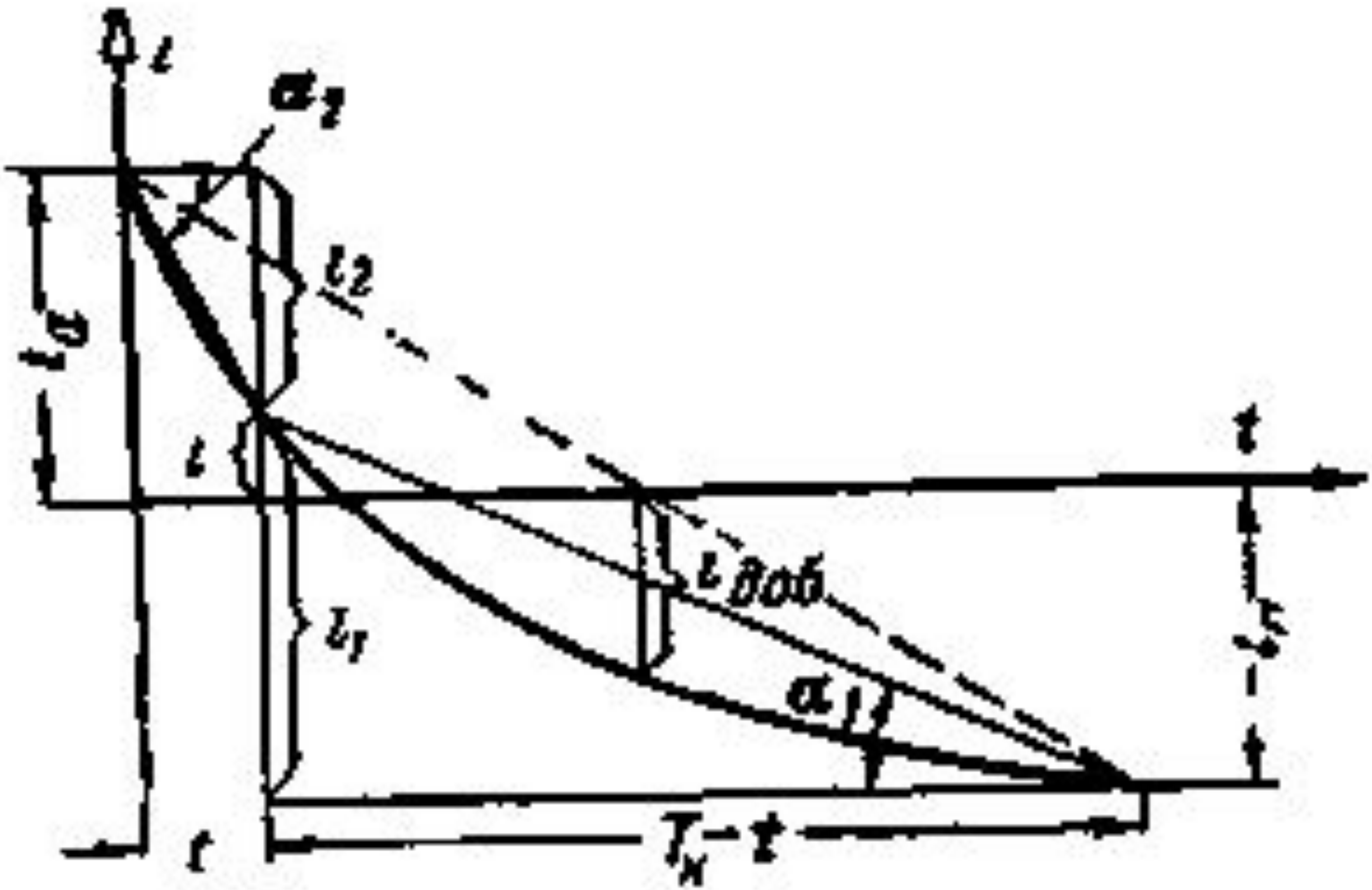

i_a
i_a
i
i_1
i_2
Сбегающий край щетки
1
2
Набегающий край щетки
$(r_1)\,s_1$
$s_2(r_2)$
$2i_a$


Коммутируемые секции
Поле само- и
взаимной индукции

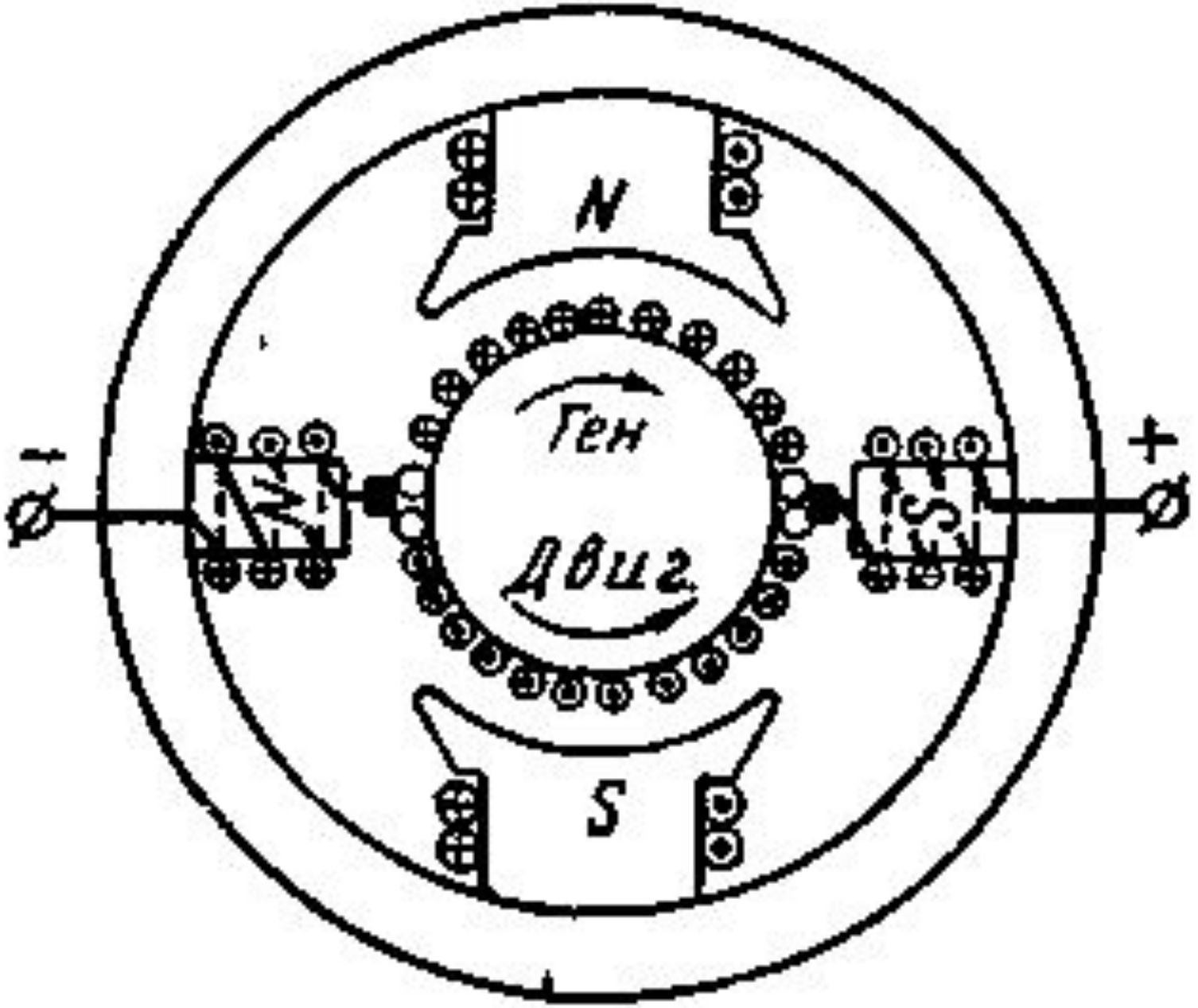

t
α_2
$t_2 = t_a - t$
t_a
t
t
$i_1 = t_a + t$
$-t_a$
α_1
t
$T_н - t$
$T_н$

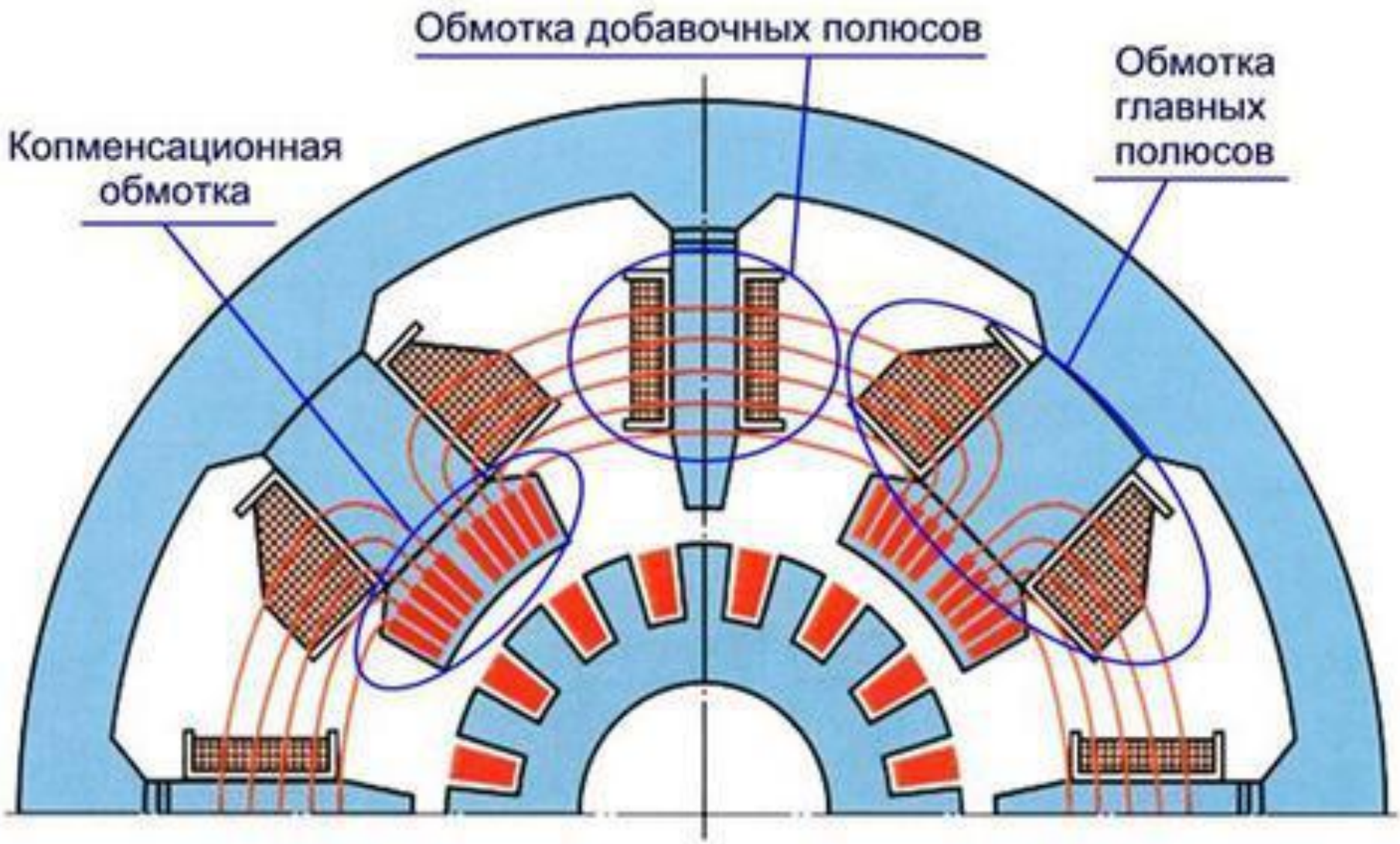


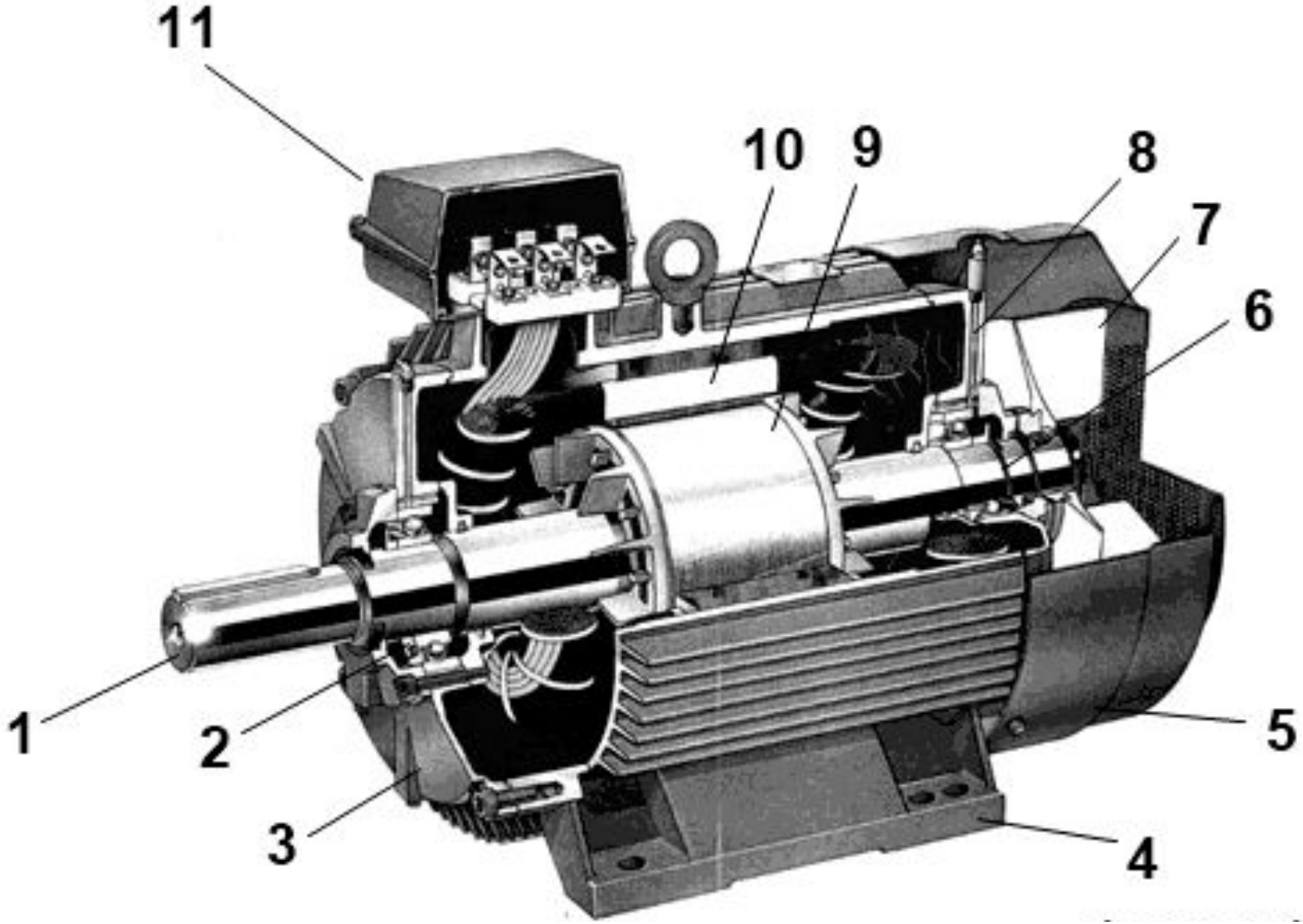
i
α_2
i_a
i_2
$i_{доб}$
t
α_1
i_1
i_a
t
$\tau_k t$
T_k

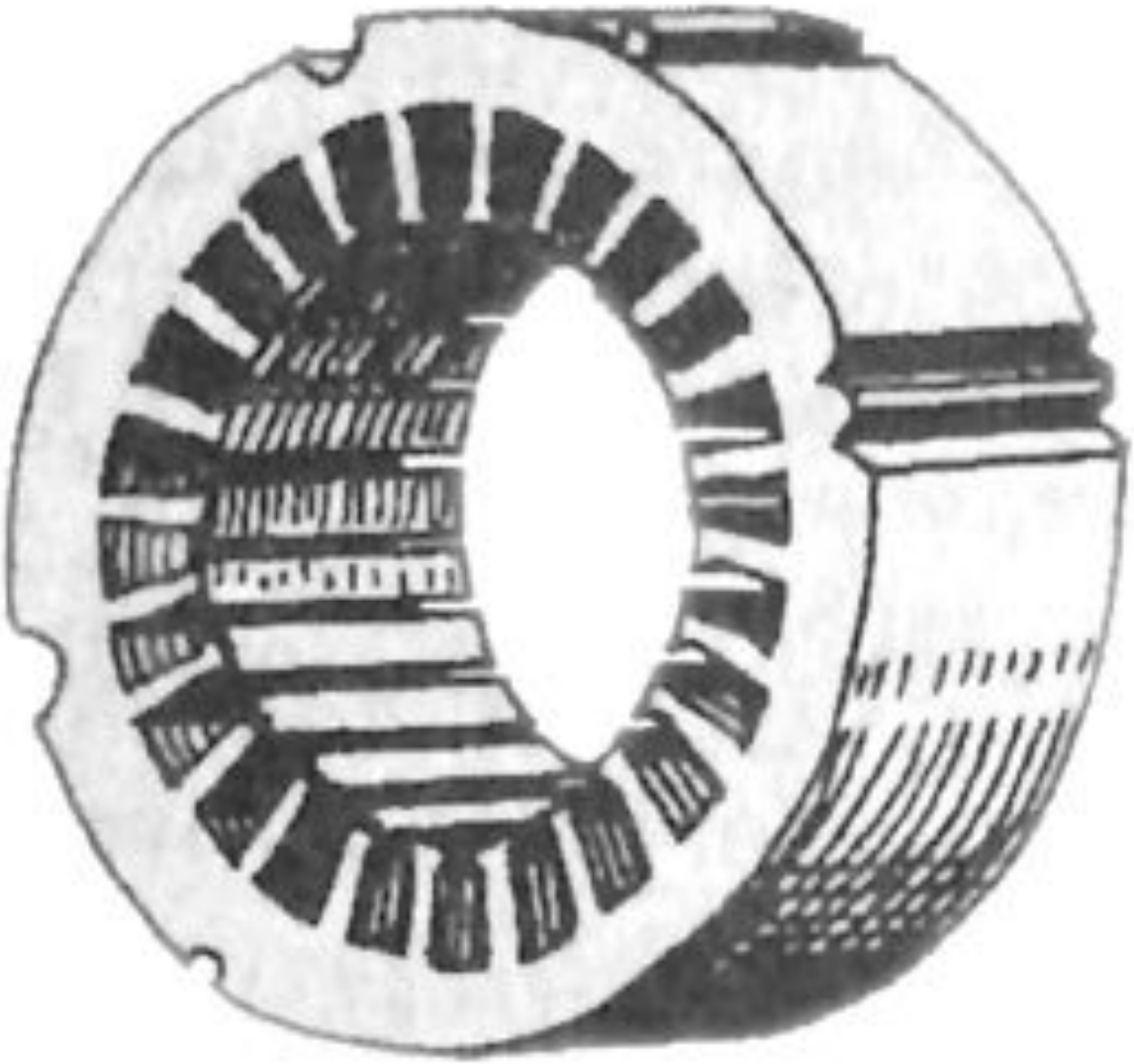


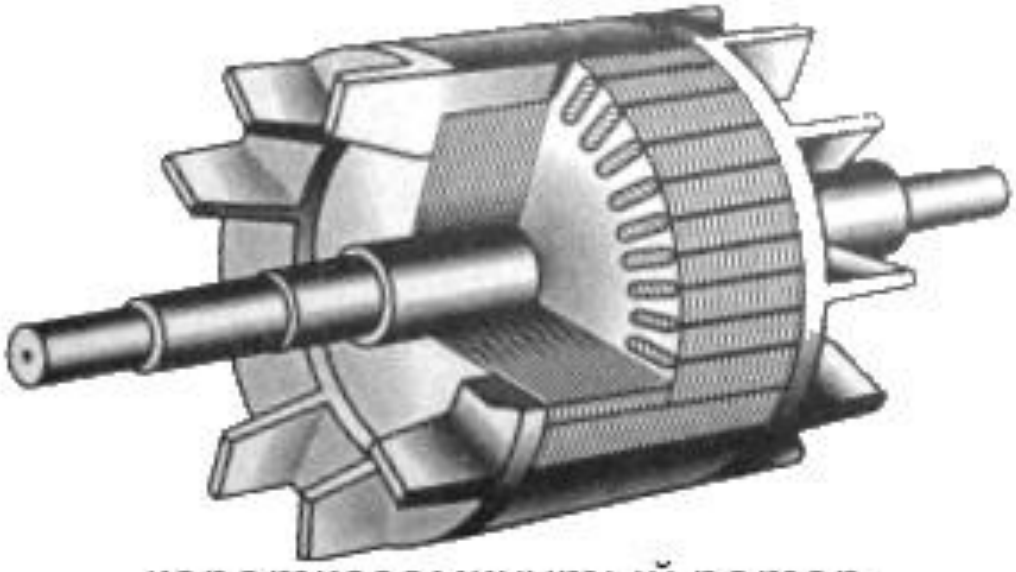
α2
t2
t
t доб
t1
α1
t
Tн − t


N
S
Ген
Двиг
~
+


Обмотка добавочных полюсов
Обмотка главных полюсов
Копменсационная обмотка

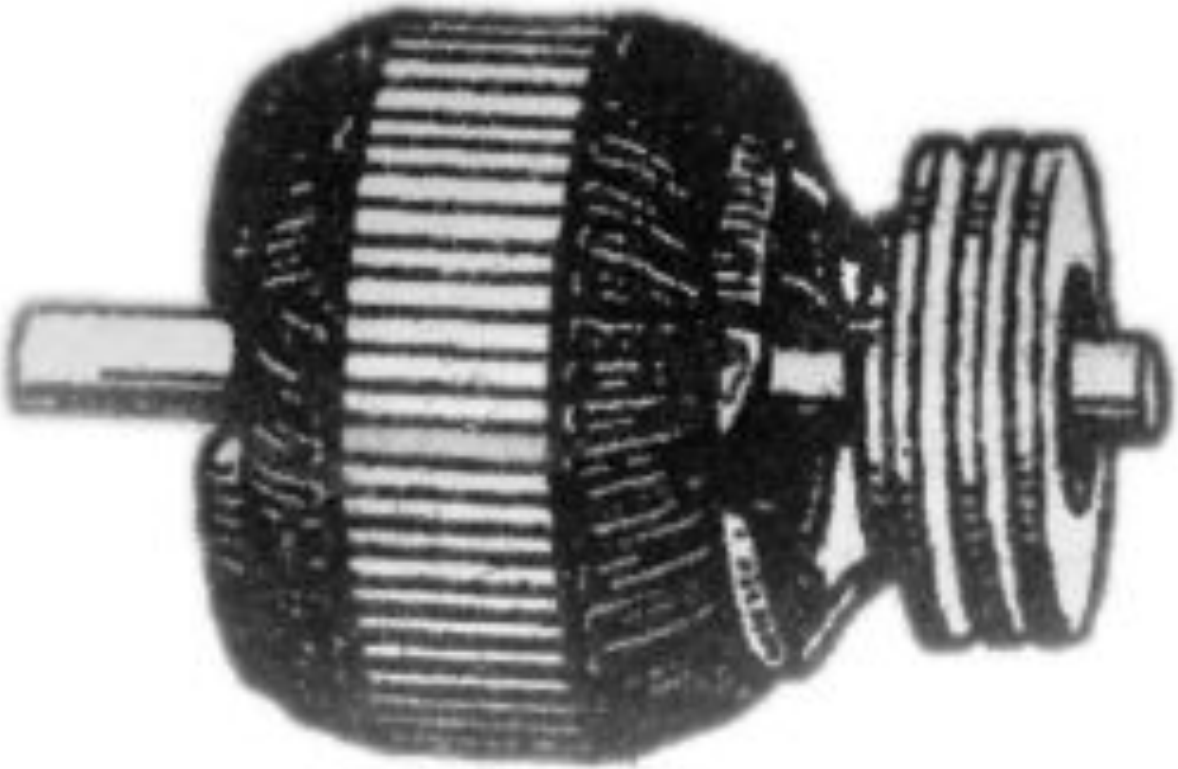

11
10
9
8
7
6
1
2
3
4
5

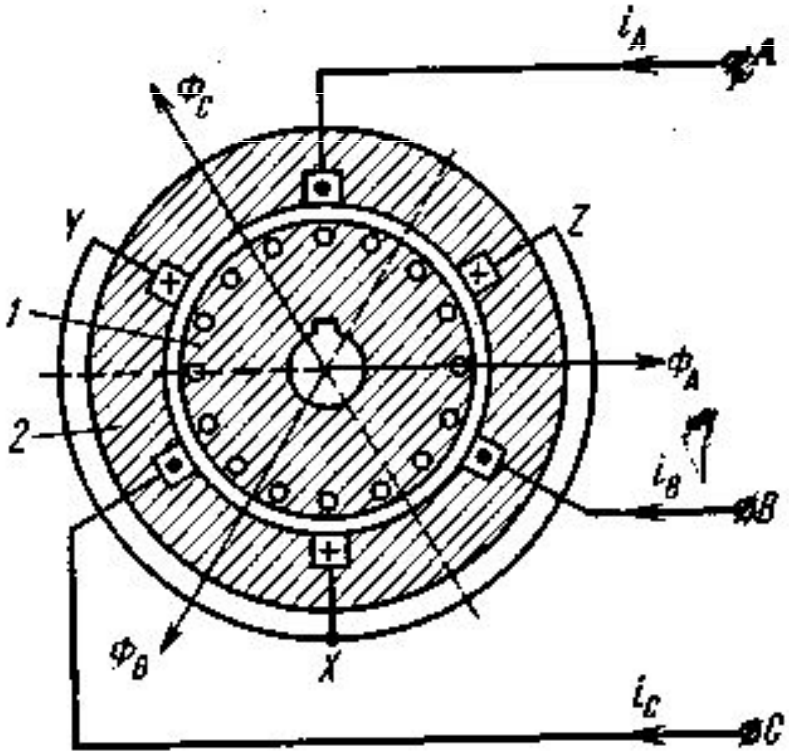


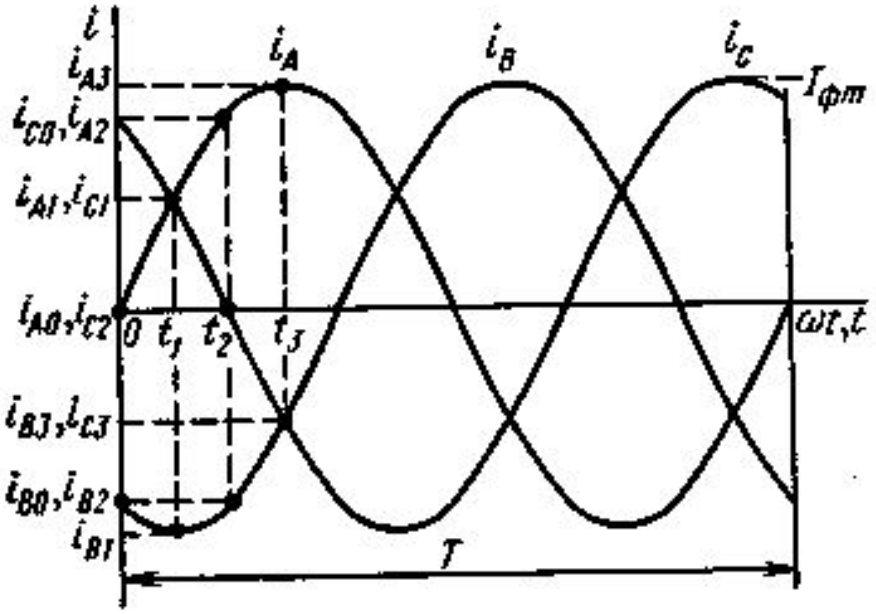


короткозамкнутый ротор

беличья клетка



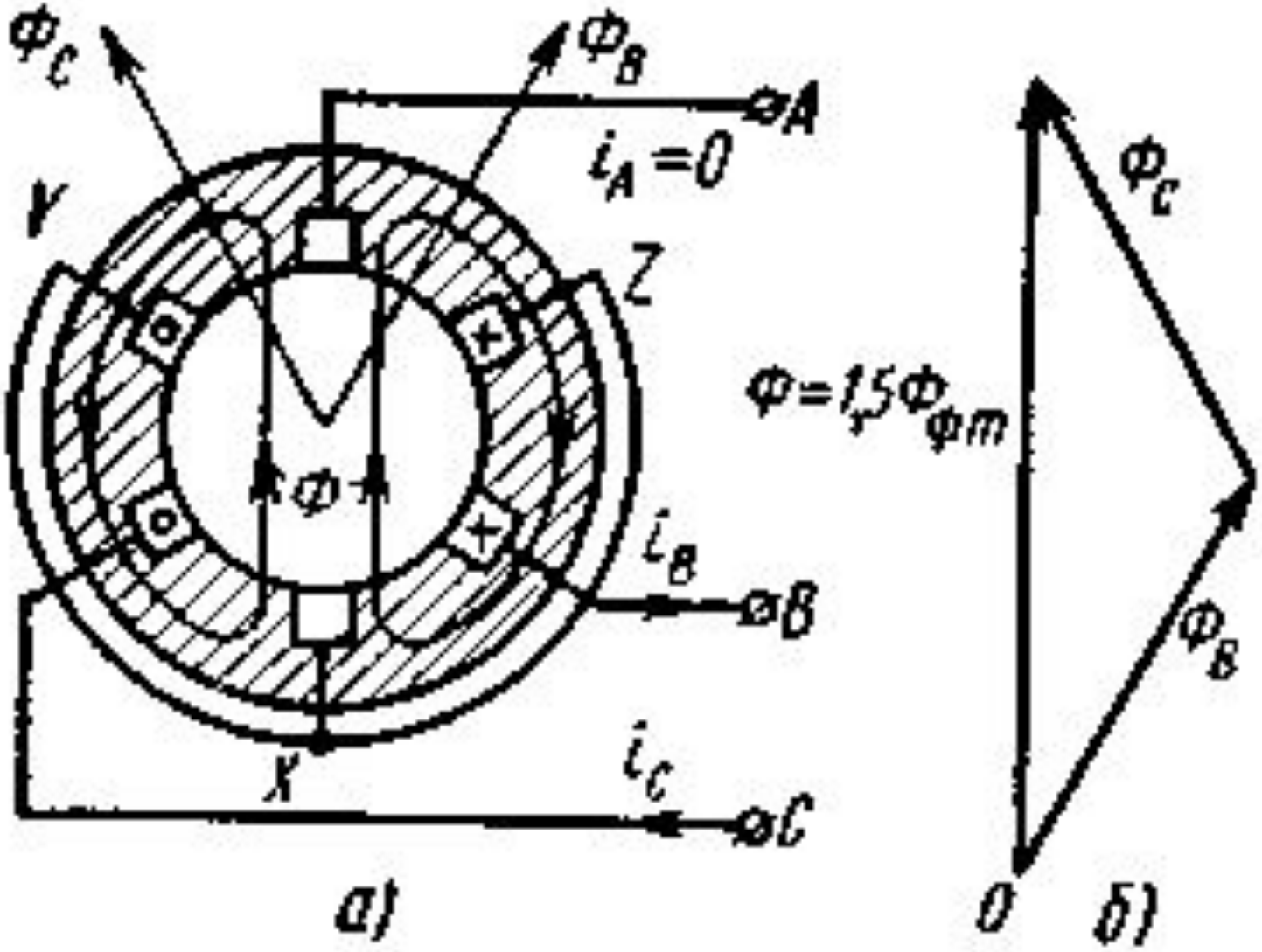


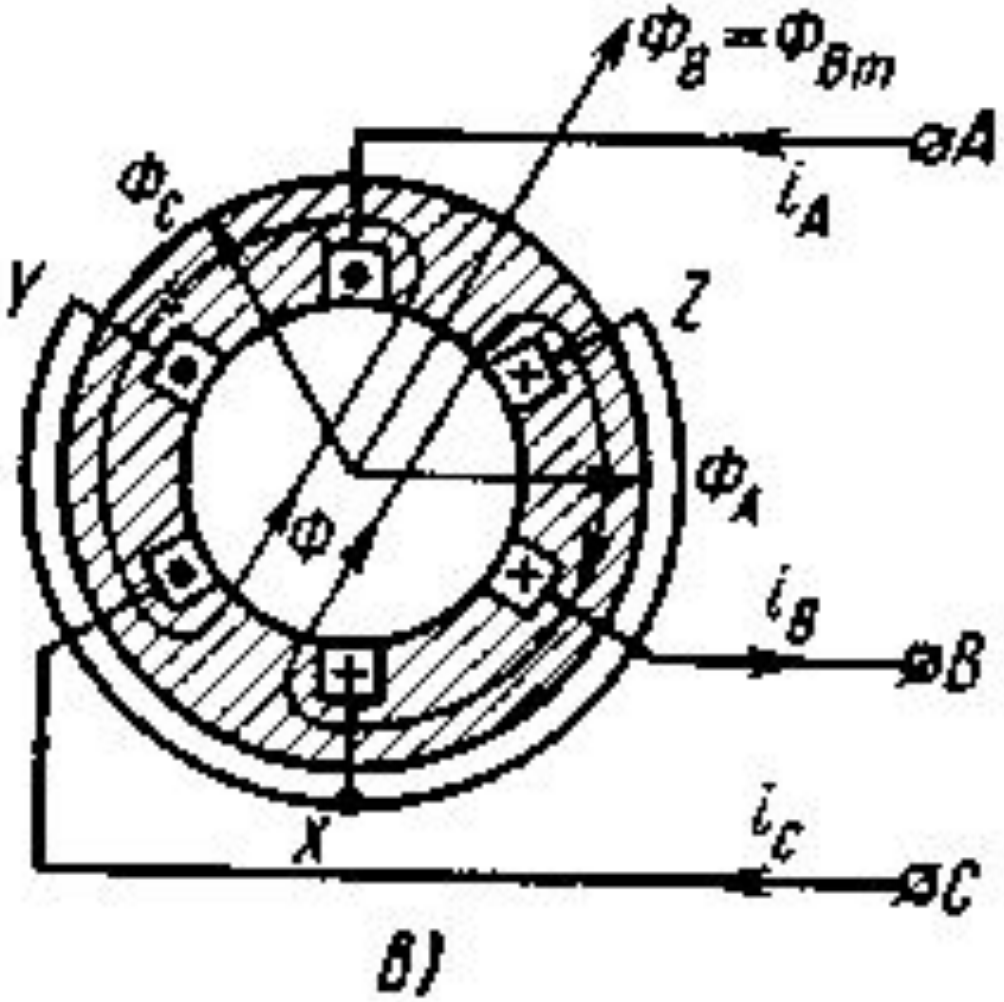


$$i_A = I_m \sin \omega t$$

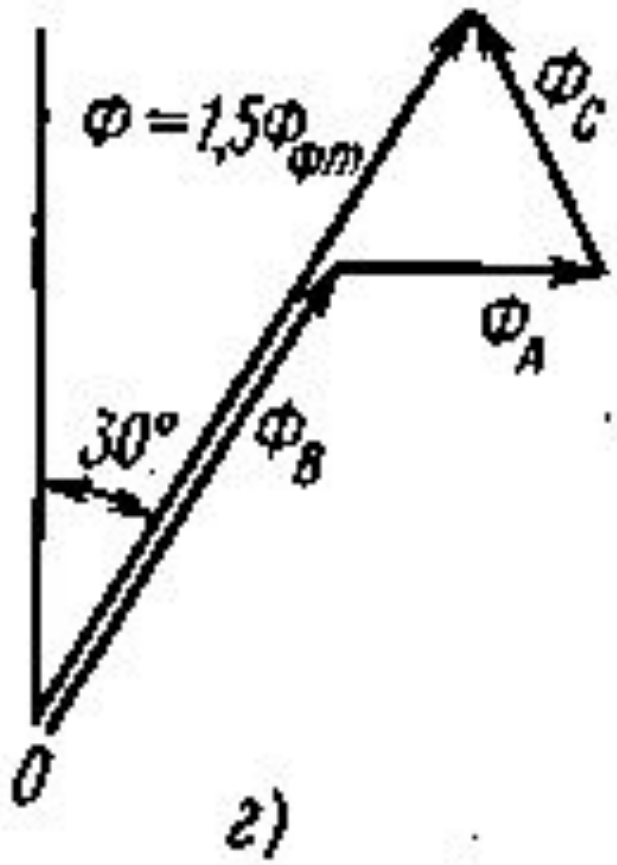
$$i_B = I_m \sin\left[\omega t - \left(2\pi / 3\right)\right]$$

$$i_C = I_m \sin\left[\omega t - \left(4\pi / 3\right)\right]$$

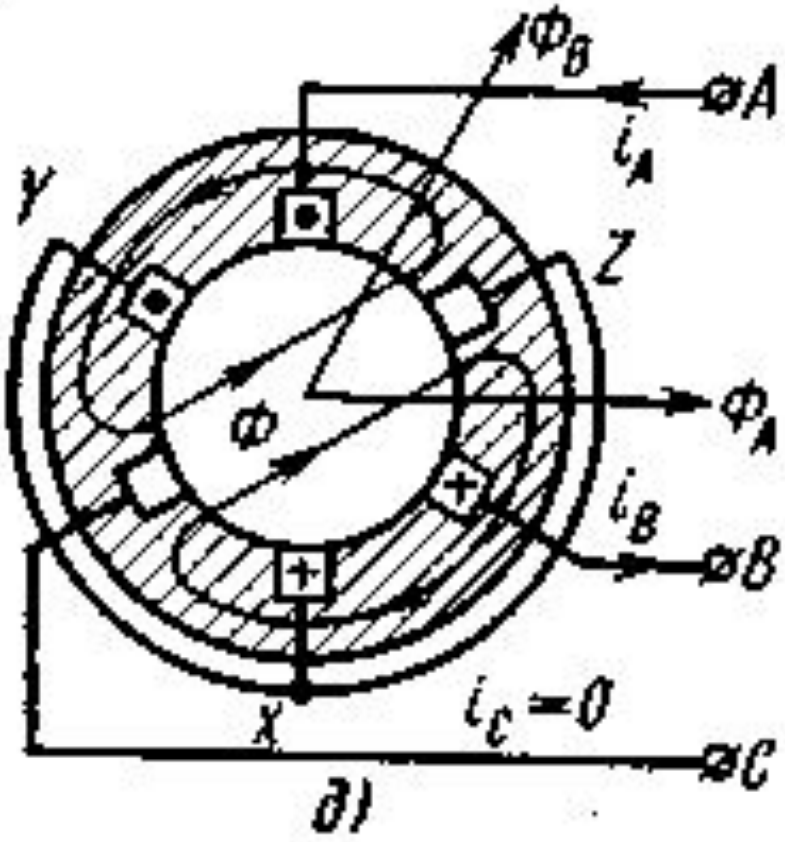

Φ_C
Φ_B
⊗A
$i_A = 0$
Y
Z
Φ
i_B
⊗B
X
i_C
⊗C
а)
Φ_C
$\Phi = 1{,}5\Phi_{\Phi m}$
Φ_B
0
б)


$\Phi_B = \Phi_{Bm}$
A
i_A
Φ_C
Y
Z
Φ_A
Φ
i_B
B
i_C
X
C

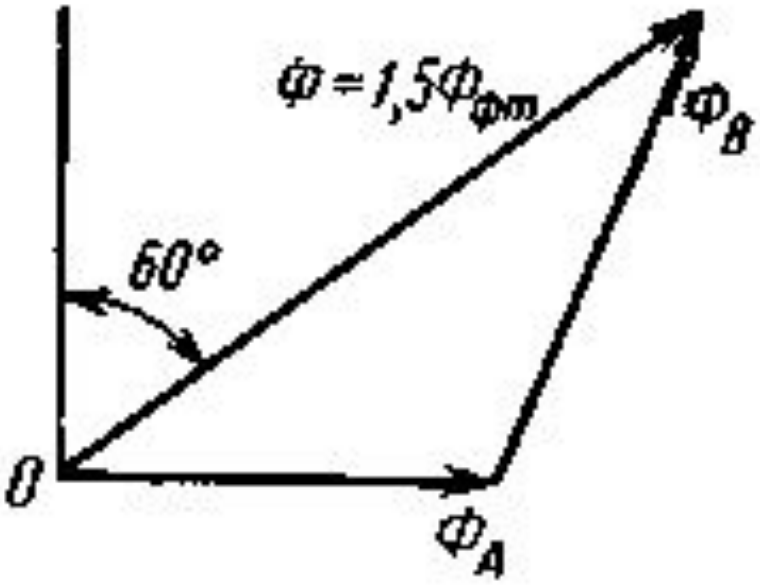
б)


$\Phi = 1{,}5\Phi_{\phi m}$
Φ_C
Φ_A
30°
Φ_B
0

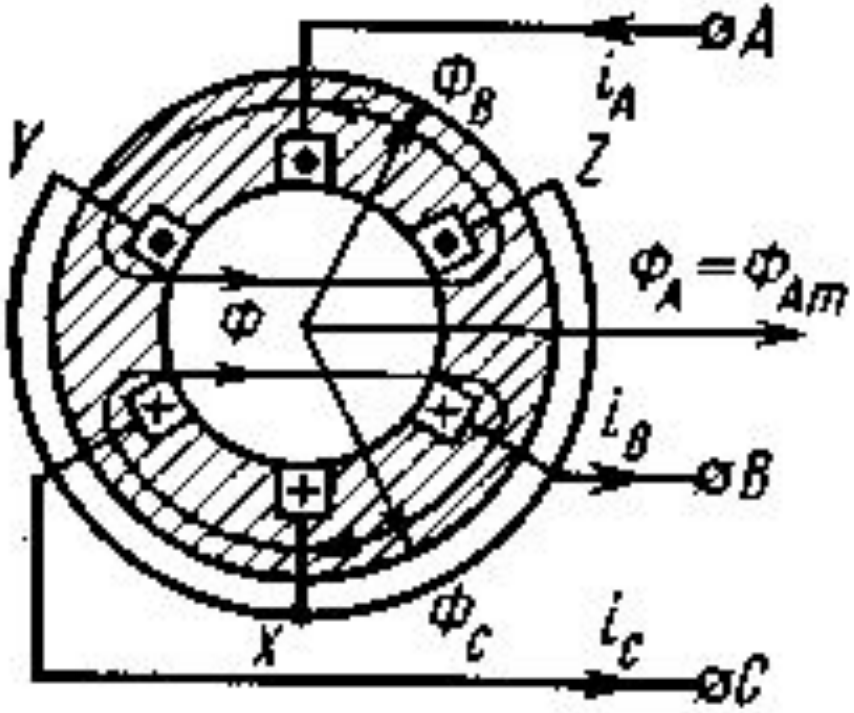
г)



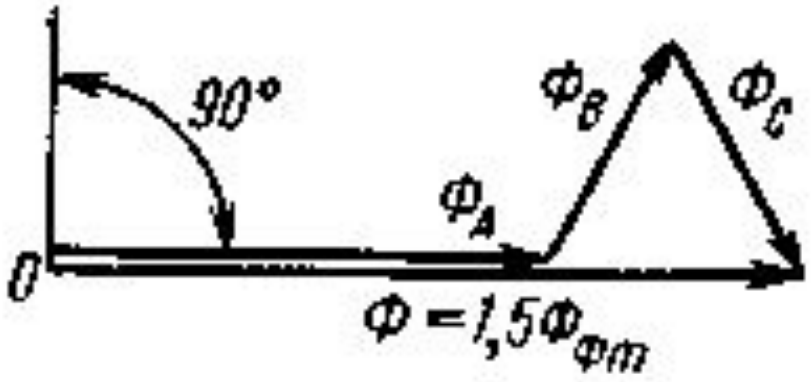
а)



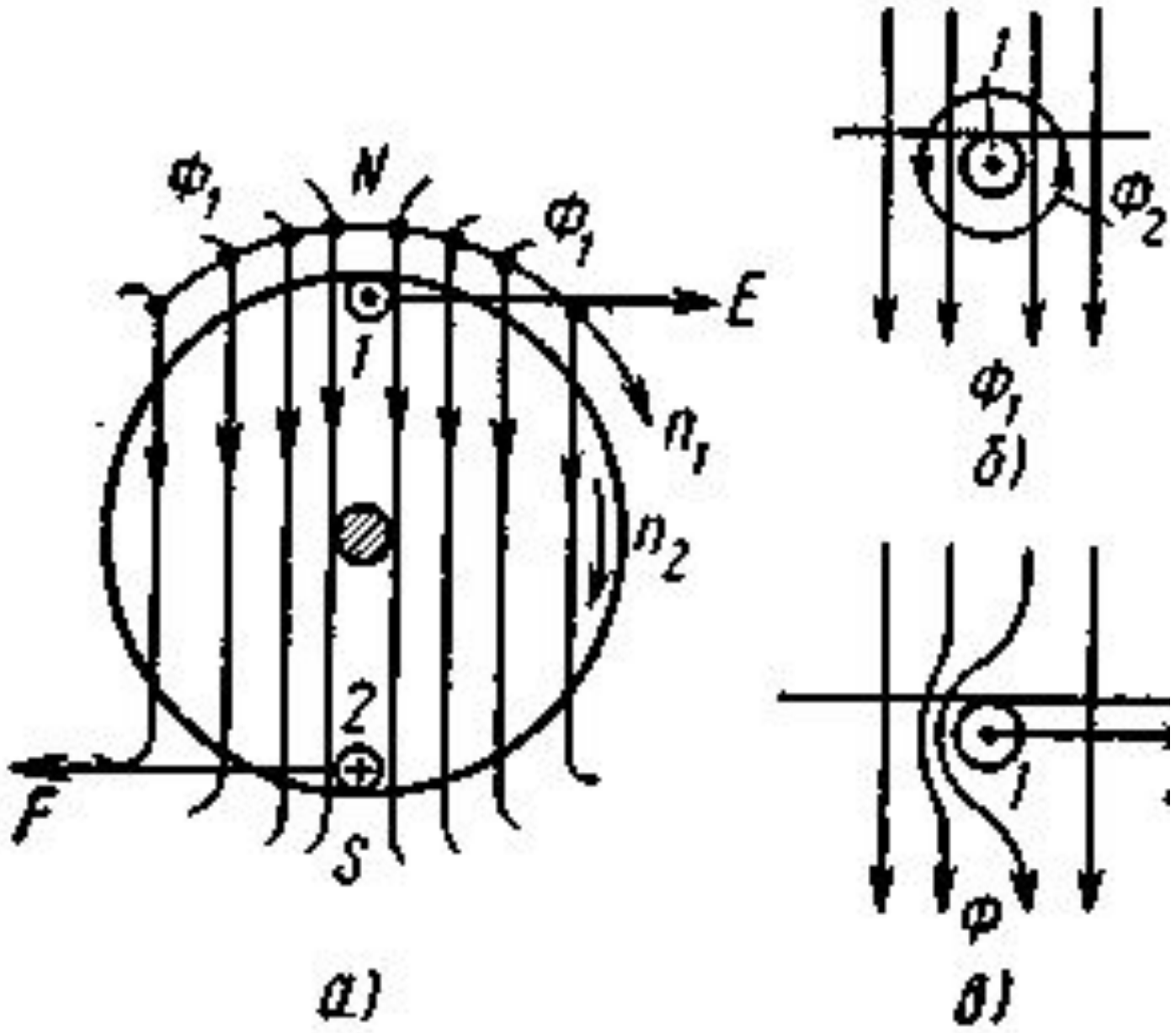
е)

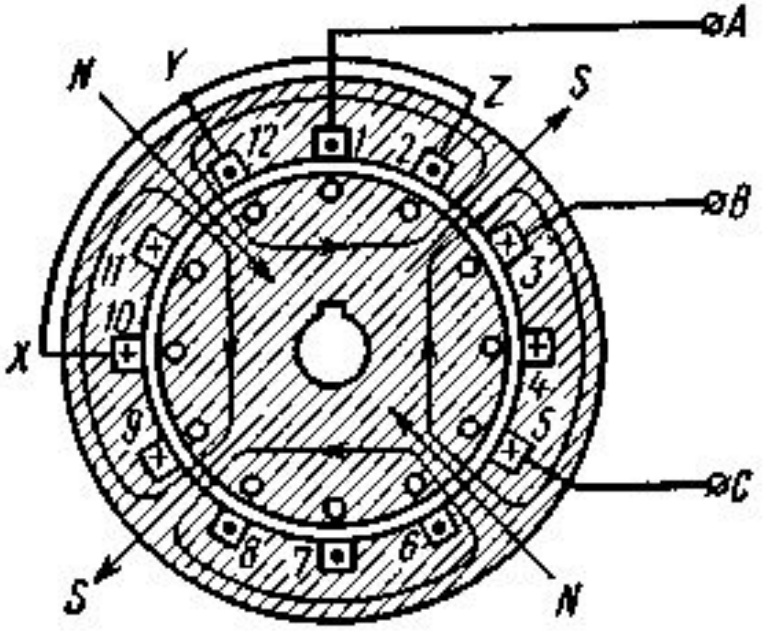

⊙A
i_A
Φ_B
Y
Z
$\Phi_A = \Phi_{Am}$
Φ
i_B
⊙B
Φ_C
i_C
X
⊙C

ж)

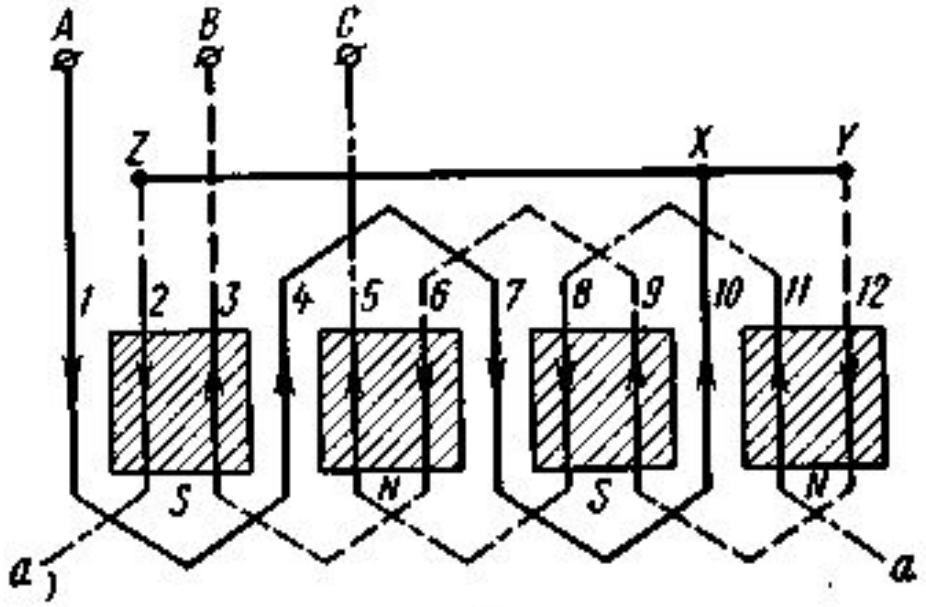

90°
Φ_B
Φ_C
Φ_A
0
$\Phi = 1{,}5\Phi_{\Phi m}$

к)

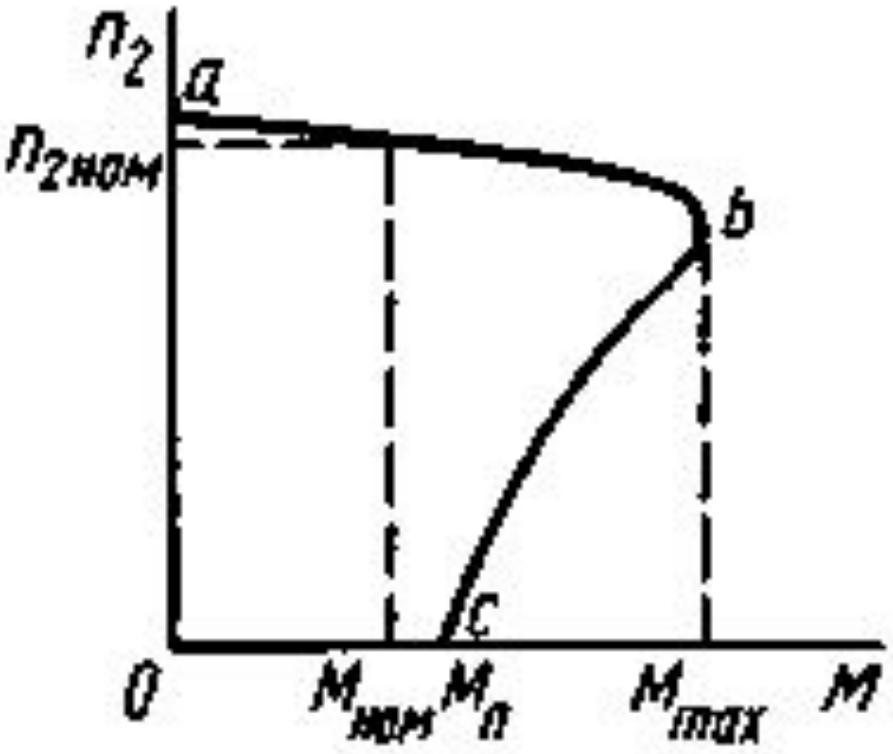

Φ1
N
Φ1
E
1
n1
n2
2
F
S
а)
1
Φ2
Φ1
б)
1
Φ
в)


A
B
C
N
Y
Z
S
X
12
1
2
3
4
5
6
7
8
9
10
11
S
N

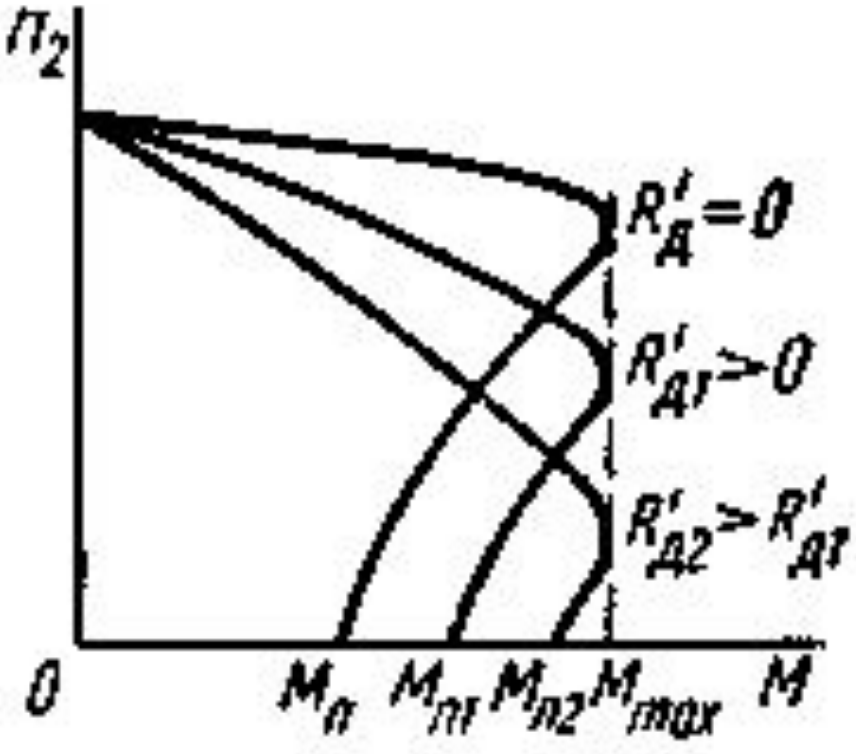
а)


A
B
C
Z
X
Y
1
2
3
4
5
6
7
8
9
10
11
12
S
N
S
N
a
a

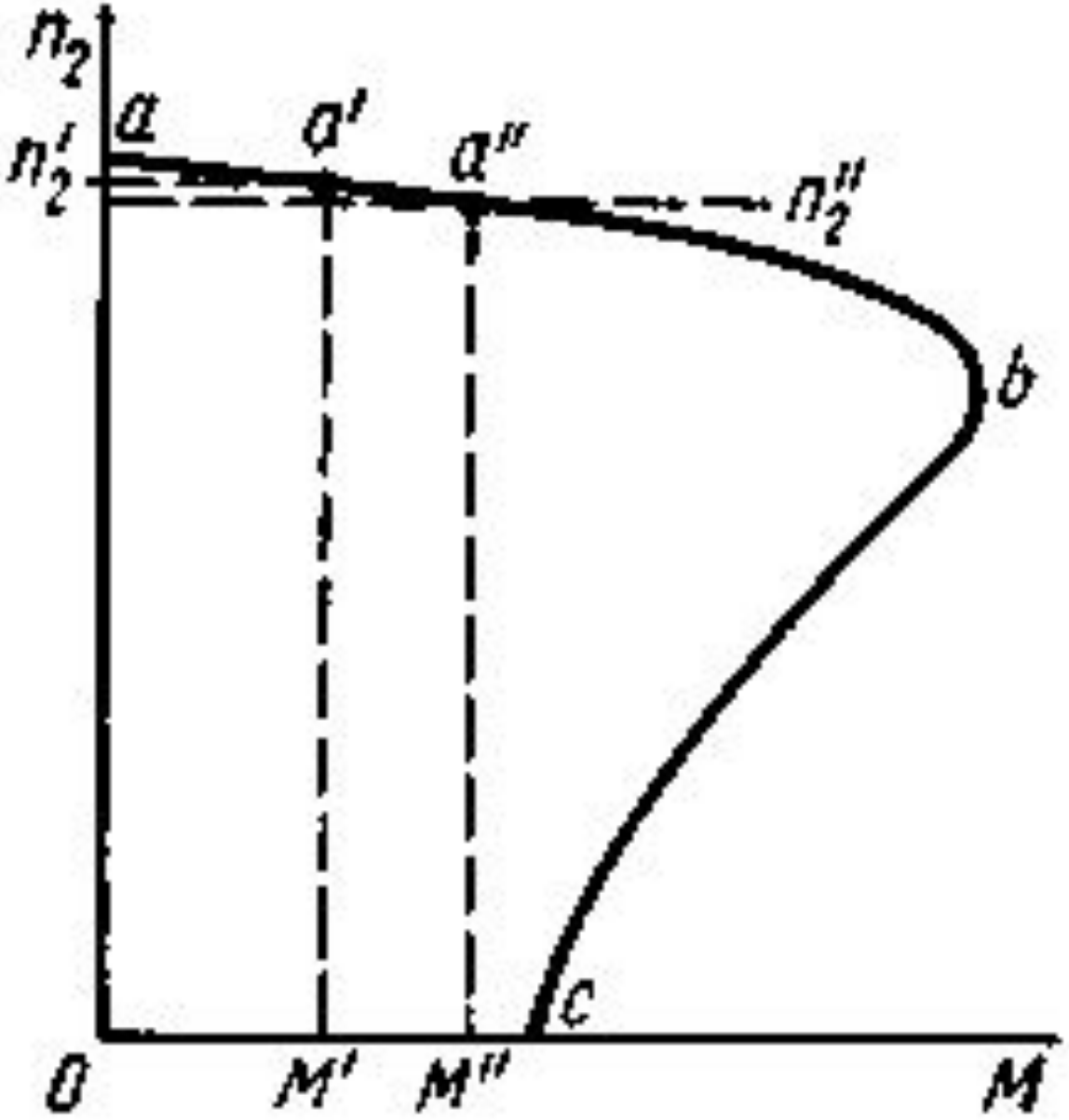
б)

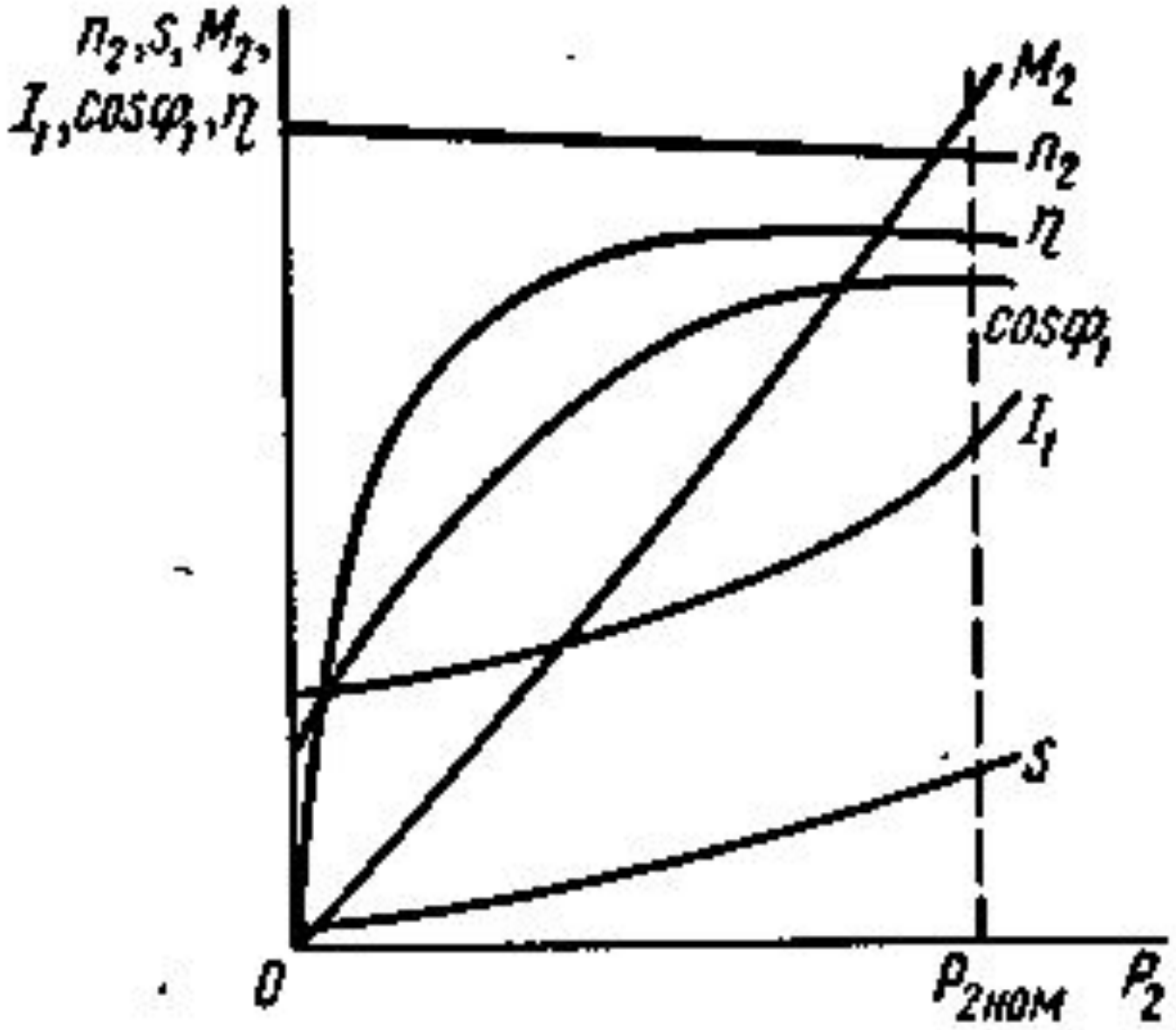

n2
a
n2ном
b
c
0
Mном
Mп
Mmax
M

а)


n2
R'д=0
R'д1>0
R'д2>R'д1
0
Mп
Mп1
Mп2
Mmax
M

б)


n_2
a
a'
a''
n_2'
n_2''
b
c
0
M'
M''
M


n2, S, M2,
I1, cosφ1, η
M2
n2
η
cosφ1
I1
S
0
P2ном
P2