



TOMSK POLYTECHNIC UNIVERSITY

TURBINES OF NPP

MAIN FEATURES

- Features of NPP turbines
- Advantages of turbines with low rotation
- Features of turbine with radioactive steam
- Characteristics of turbines for NPP with WWER
- Characteristics of turbines for NPP with RBMK

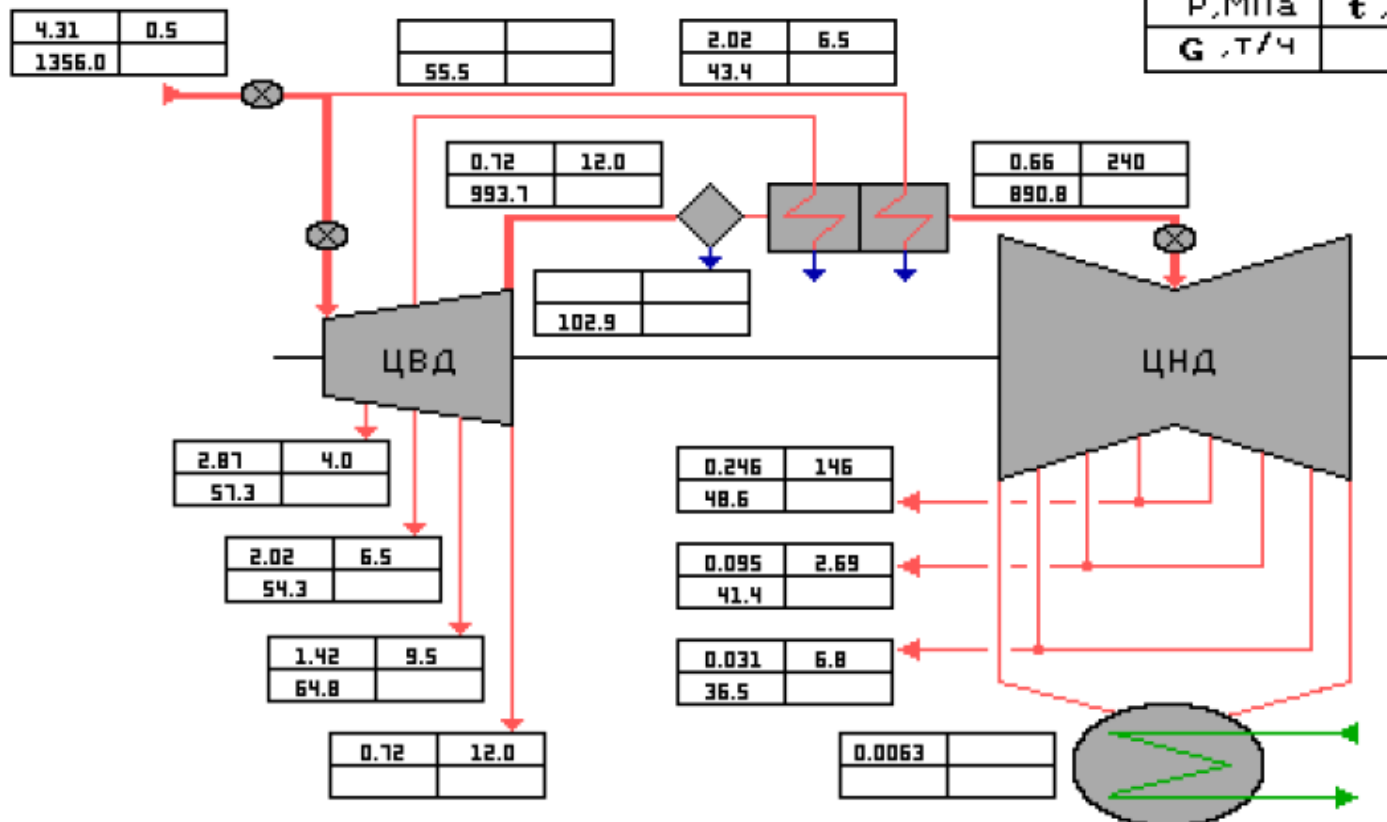
SCHEMES

СТРУКТУРНАЯ СХЕМА И ПАРАМЕТРЫ ПАРА В ОТБОРАХ К-220-44-4

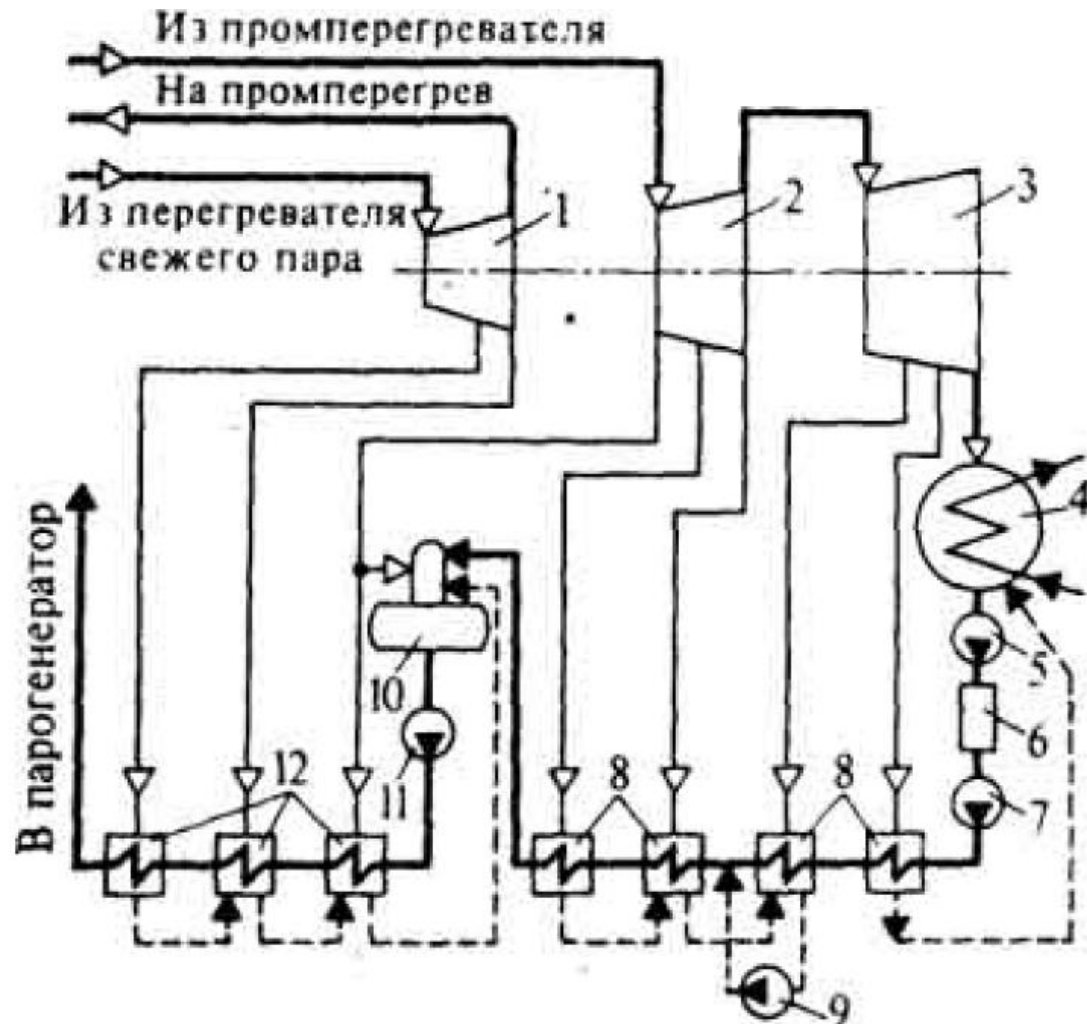
(конденсационный режим : $N_{эл} = 220$ МВт)

обозначения :

Р, МПа	t, град (У, %)
G, т/ч	



SCHEMES

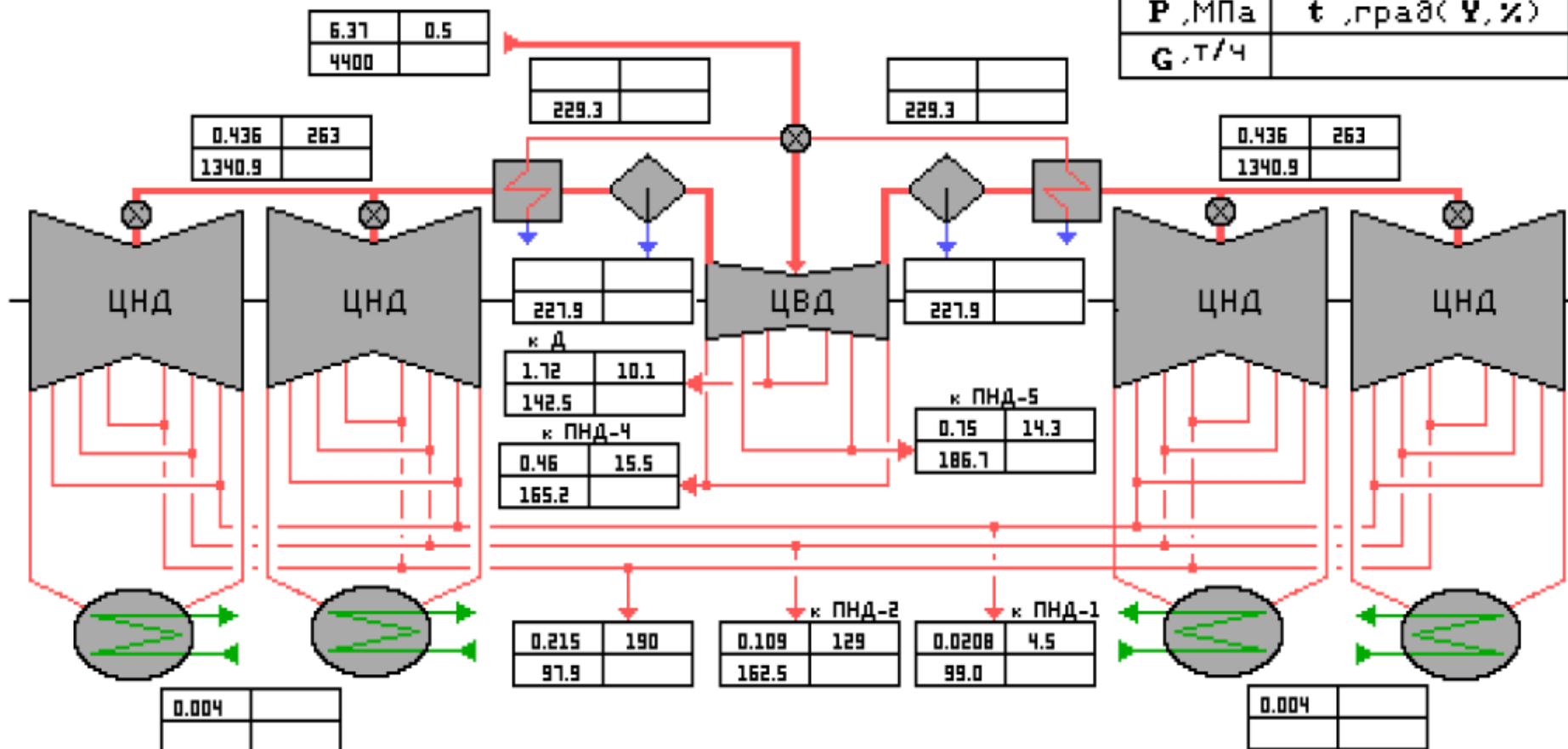


SCHEMES

Структурная схема и параметры пара в отборах К-750-65/3000

обозначения :

Р, МПа	t, град(У, %)
Г, т/ч	



SCHEMES

Структурная схема и параметры пара в отборах К-1000-60/1500-1
(турбина с боковым расположением конденсаторов)

60.0	0.5
6246.5	663.3

58.2	272.3
252.5	663.3

28.13	7.2
165.9	638.3

11.2	11.9
4692.2	607.4

10.86	250
4139.9	702.3

3.11	0.17
3436.4	650.4

11.15	183.8
553	186.3

10.86	250
124.9	702.3

5.92	0.0
302.08	675.1

3.18	0.4
275.1	650.4

0.839	2.75
203.2	606.7

0.227	10
179.13	588.1

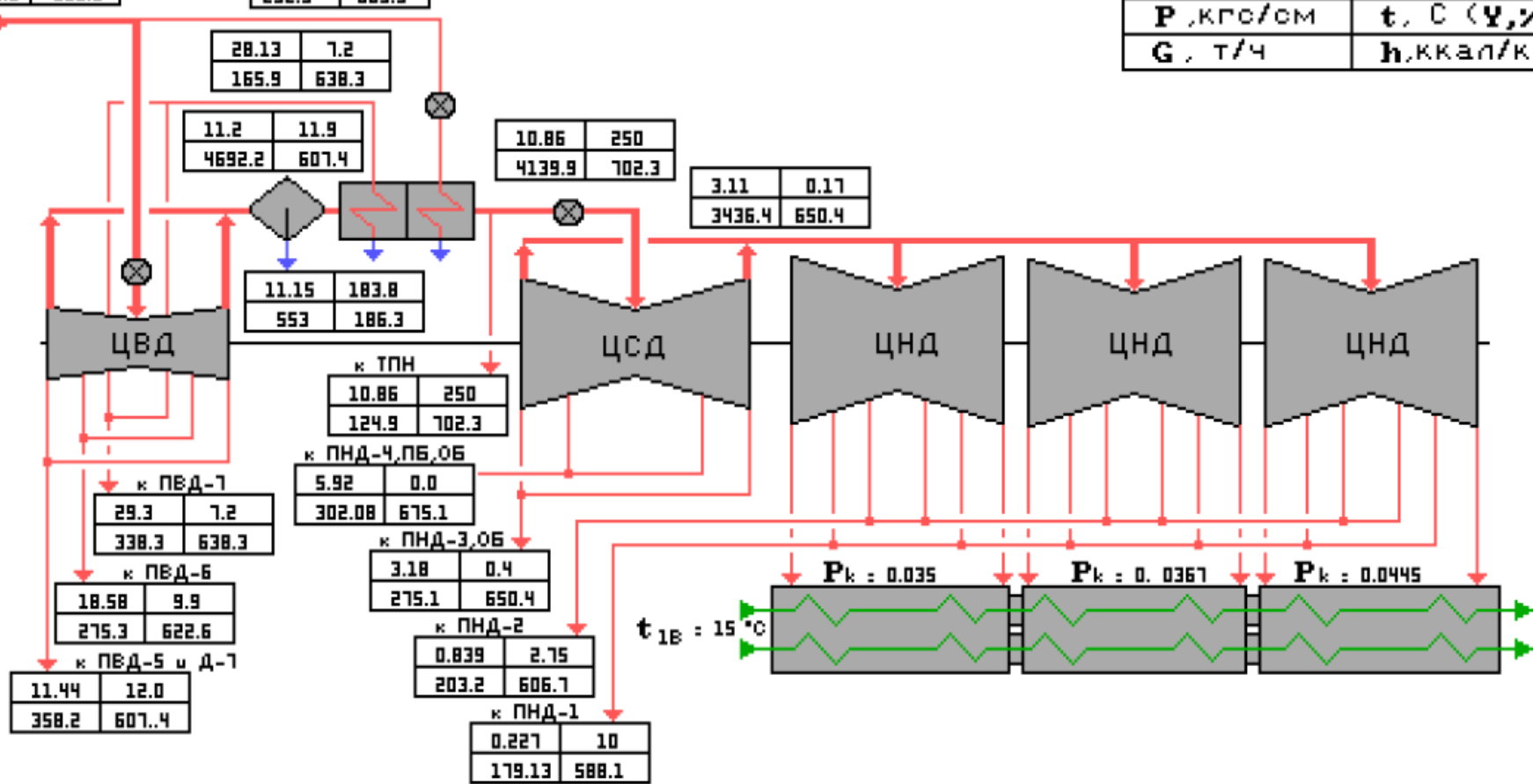
29.3	7.2
338.3	638.3

18.58	9.9
275.3	622.6

11.44	12.0
358.2	607.4

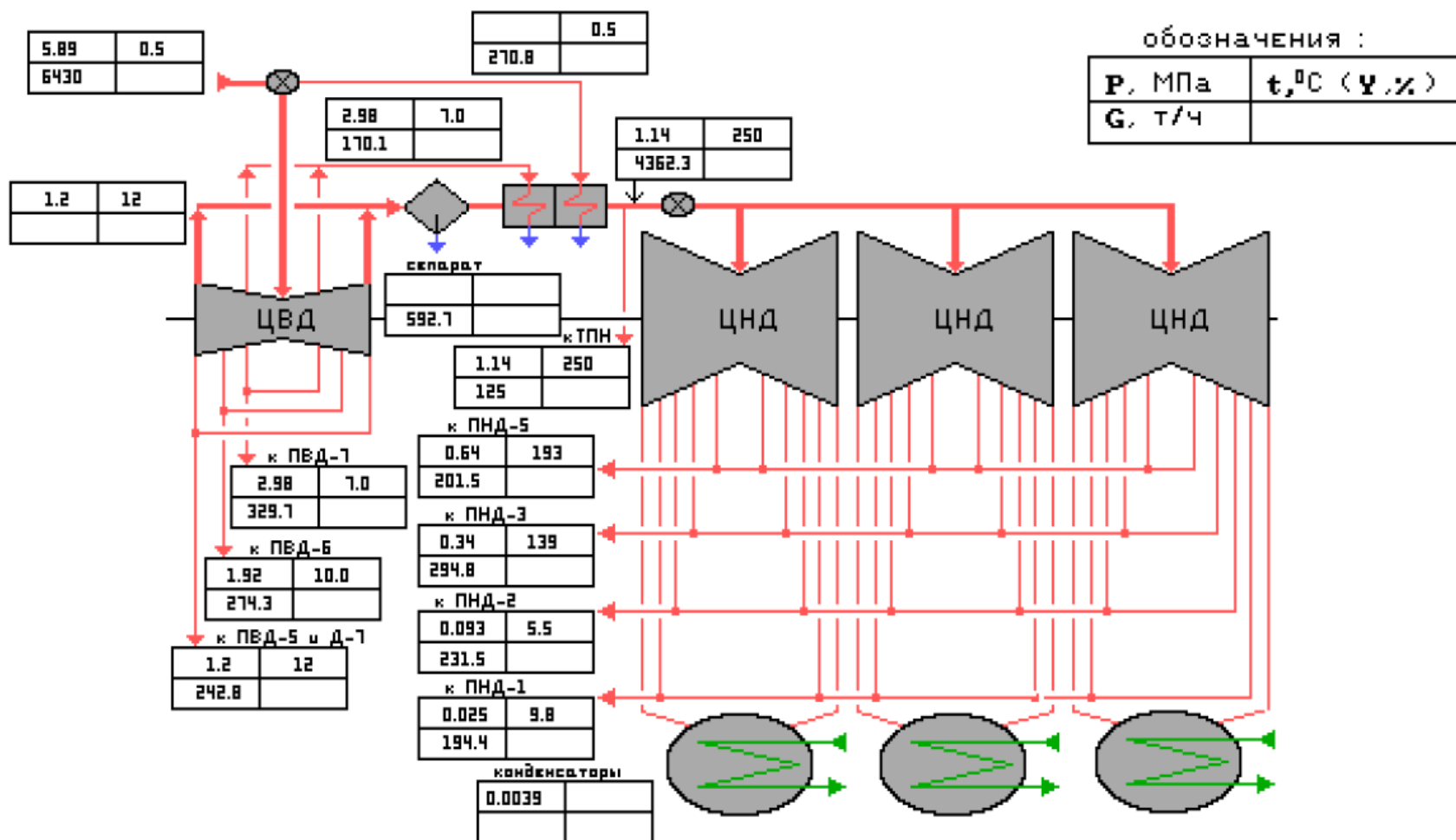
Обозначения :

P , кгс/см	t , С (У,%)
G , т/ч	h , ккал/кг



SCHEMES

Структурная схема и параметры пара в отборах К-1000-60/1500-2



FEATURES OF NPP TURBINES

Features:

- Low efficiency;

 - Increasing humidity by 1 % decreases efficiency by 1%:

$$\eta_{oi \text{ вл}} = \eta_{oi} \times \alpha_{cp} / 100.$$

- High steam flow rates;

- High humidity:

 - Erosion of blades;

 - Low efficiency;

 - Low reliability.

FEATURES OF LOW ROTATION TURBINES

Advantages:

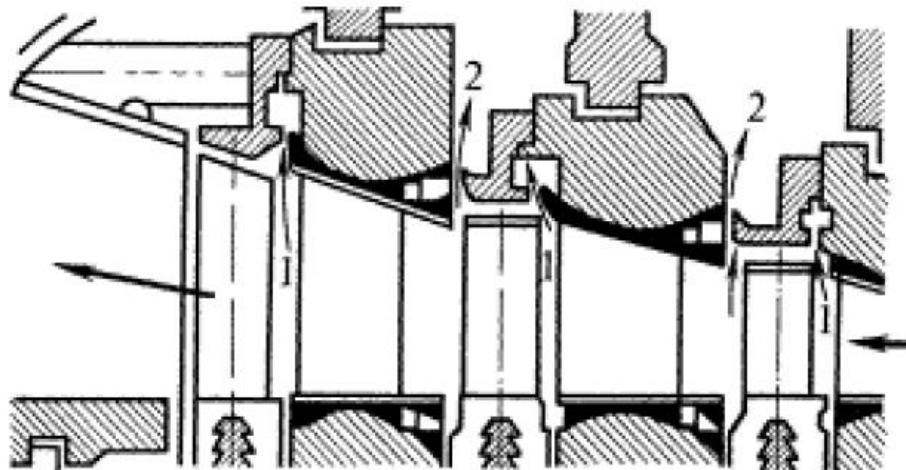
- Significant increasing of cross-section of exhaust;
- Decreasing of numbers of low-pressure cylinders;
- Decreasing of outflowing losses;
- High efficiency;

Disadvantages:

- High metal-capacity;
- High cost.

METHODS OF DECREASING HUMIDITY

1. External separation.
2. Internal separation.
 1. Steam is taken from humid-catching device and put into regeneration system.
 2. The larger flow rate – the higher efficiency of separation.





THANK YOU FOR YOUR ATTENTION