

# «Three gases tanks»

## ARIZ task

The solution's process

from the education team of «COMCON\*TRIZ»

Ukraine

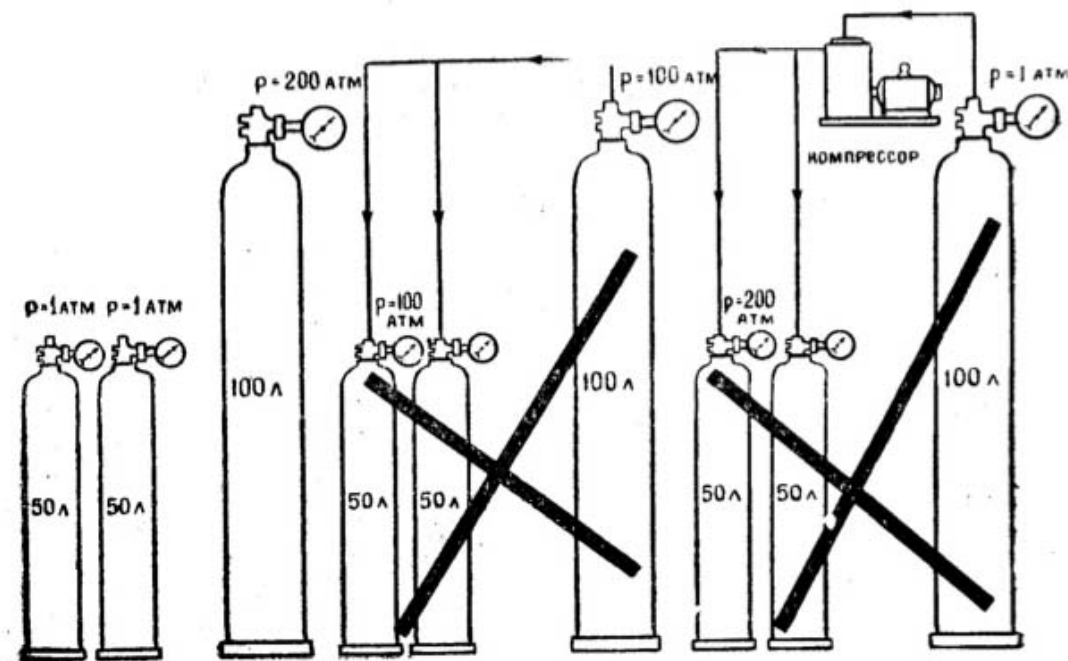
December, 2016

*Г. Альтшуллер*

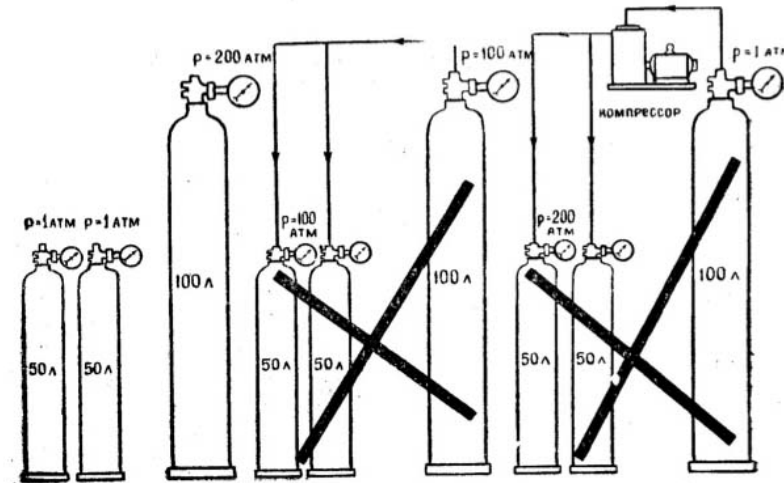
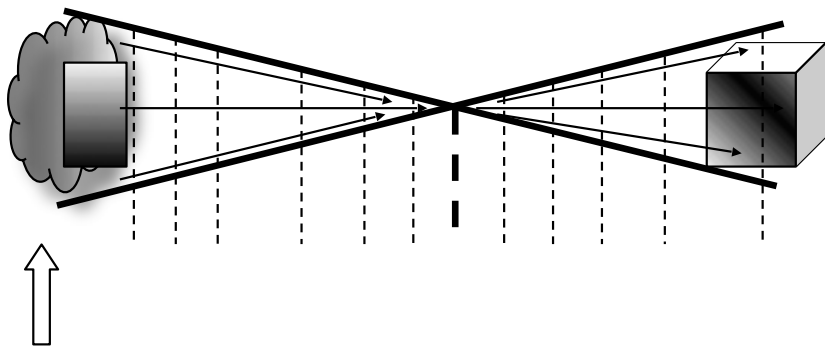


# КАК научиться ИЗОБРЕТАТЬ

ТАМБОВСКОЕ КНИЖНОЕ ИЗДАТЕЛЬСТВО  
1961



Task and picture - from the first TRIZ book of the G.S. Altshuller «Как научиться изобретать» («How to learn to invent»), 1961.



### Situation

There are three tanks: one big (100 liters) and two small (50 liters).

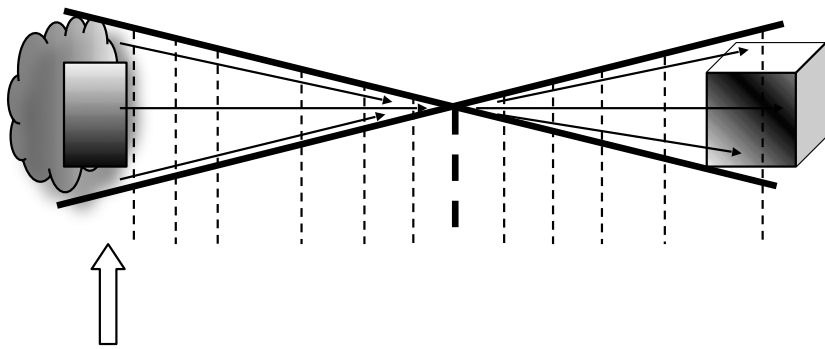
The big tank contains a gas (oxygen) with a pressure of 200 atm.

Small tanks is empty.

If the compressor is not use - only part of the gas will remain in the big tank (and the gas pressure will be reduced).

If the compressor is used - the all gas move from the big tank into two smaller tanks.

It's necessary to move all gas from the big tank into the two small tanks - without compressor.



Step 1.1.

**Mini-task**

A technical system for moving of gas includes the three tanks (big and small) and gas inside big tank.

**TC-1**

If the compressor is not used - the all gas is not moving but system is simple.

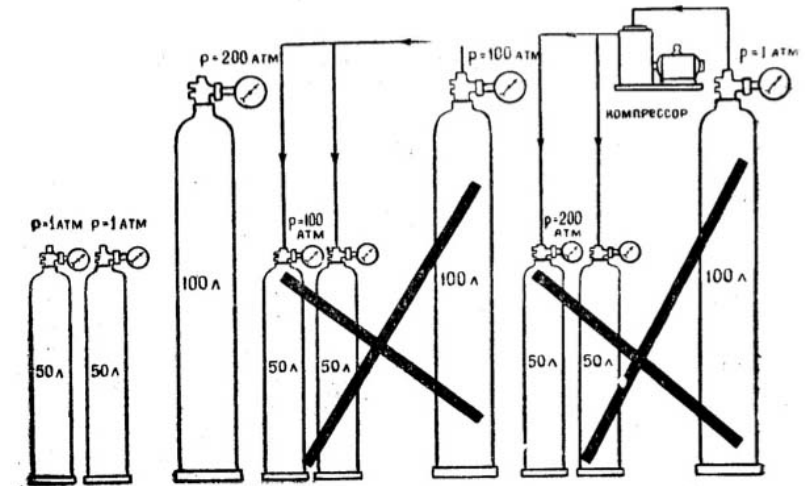
**TC-2**

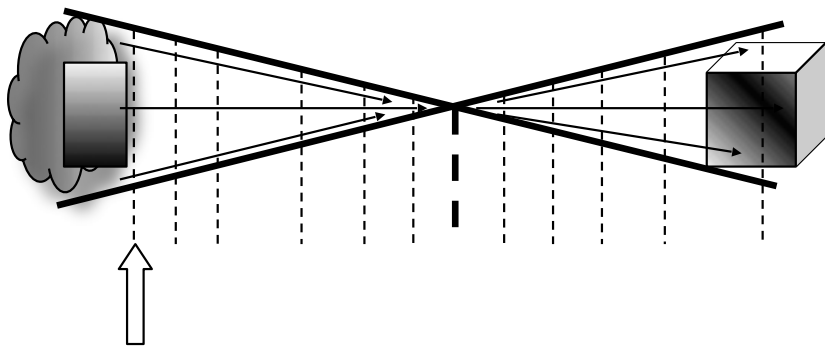
If the compressor is used - the all gas is moving but system is not simple.

**It is necessary, that all gas is moving without compressor.**

Process for the solution of the task.

Using ARIZ-85V





**Step 1.2.**

**Product** - gas.

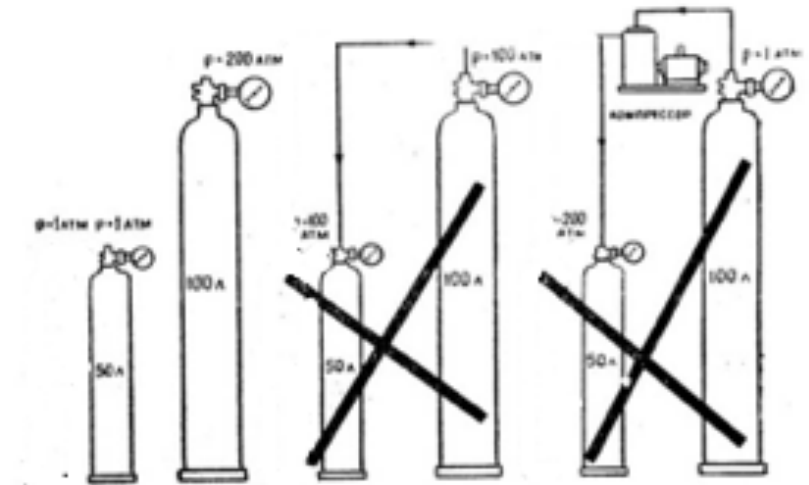
**Instrument** - tanks and compressor.

**Rule 1.** Compressor has two conditions:  
absent and present.

**Rule 2.** Mini-task include big tank  
and one small tank.

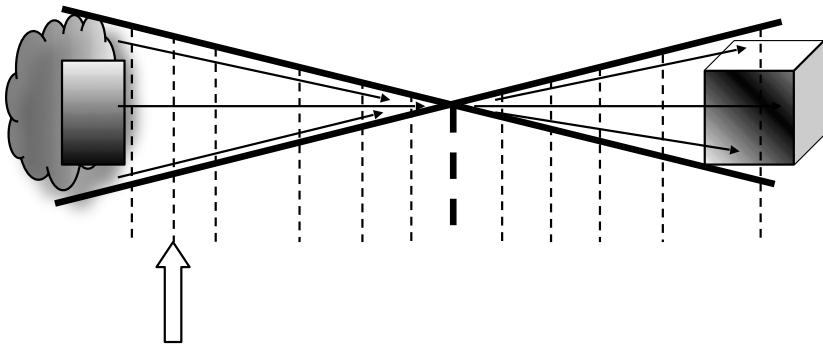
**Process for the solution of the task.**

**Using ARIZ-85V**



Process for the solution of the task.

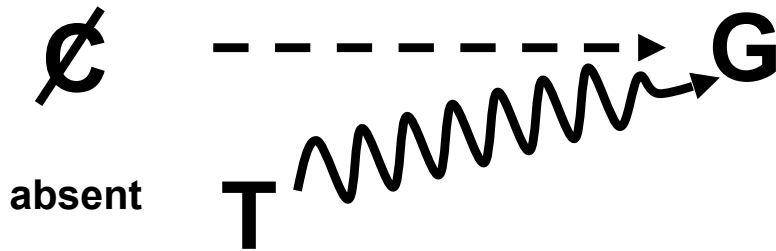
Using ARIZ-85V



Step 1.3.

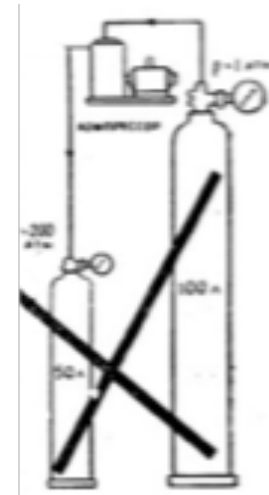
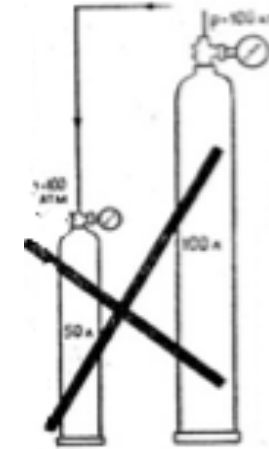
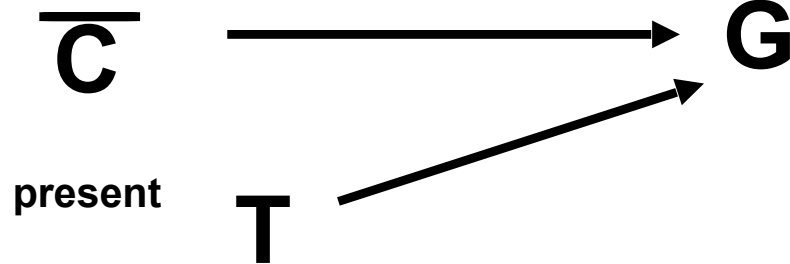
TC-1

simple  
system



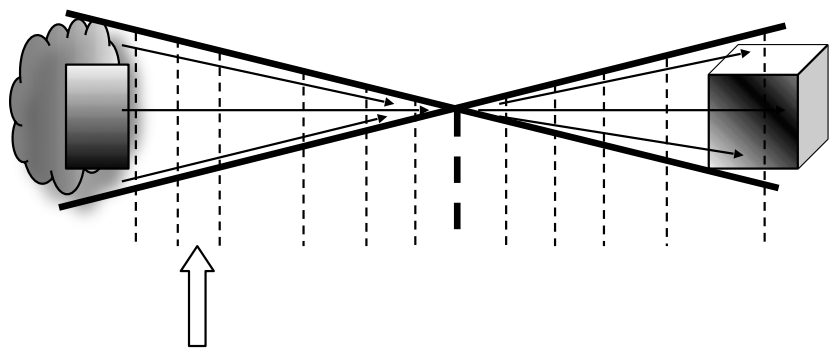
TC-2

not  
simple  
system



Process for the solution of the task.

Using ARIZ-85V

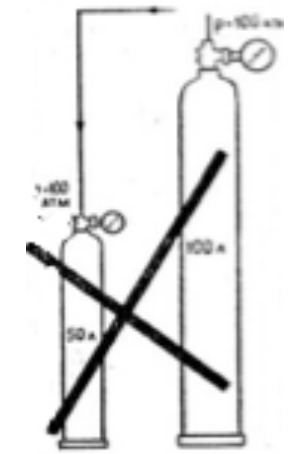
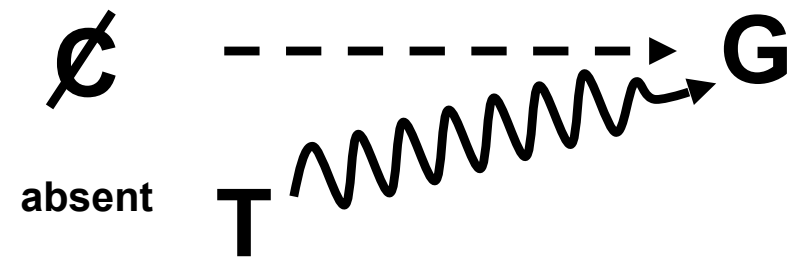


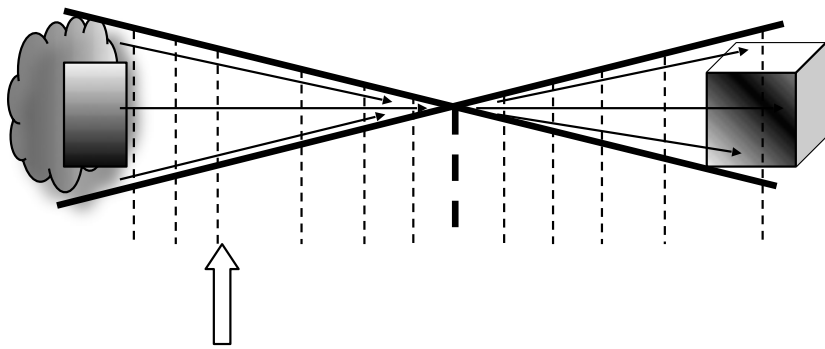
Step 1.4.

Main process - all gas is moving without compressor.

It is necessary to choose TC-1

TC-1  
simple  
system



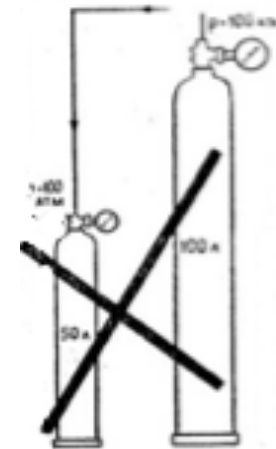
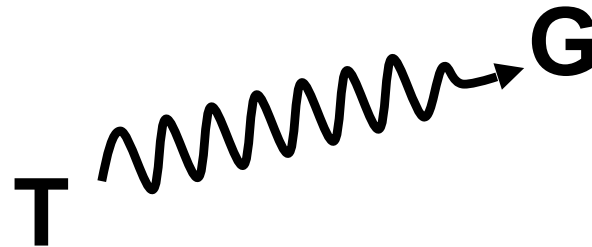


Process for the solution of the task.

Using ARIZ-85V

Step 1.5.

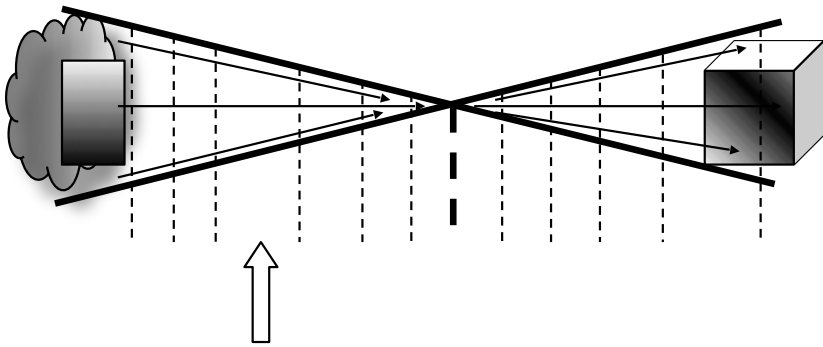
Compressor is **absent**.  
System is very simply,  
but **tanks** can't to help moving **all** gas.





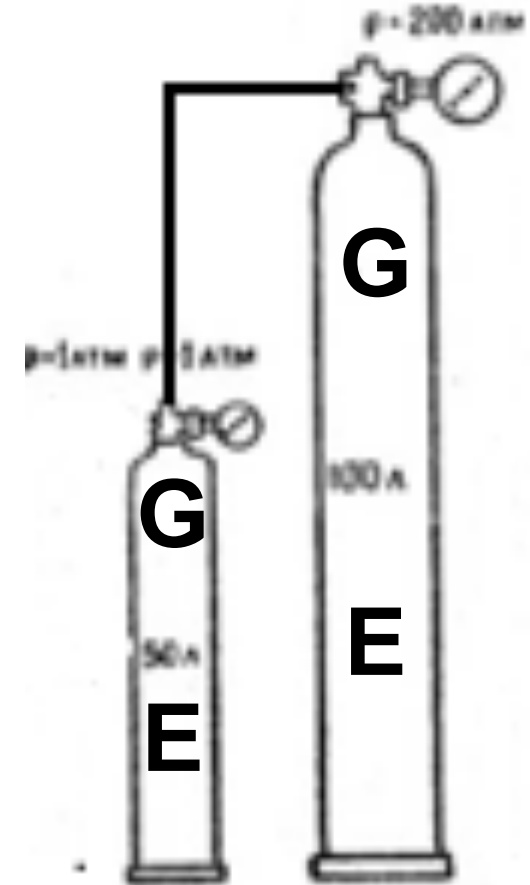
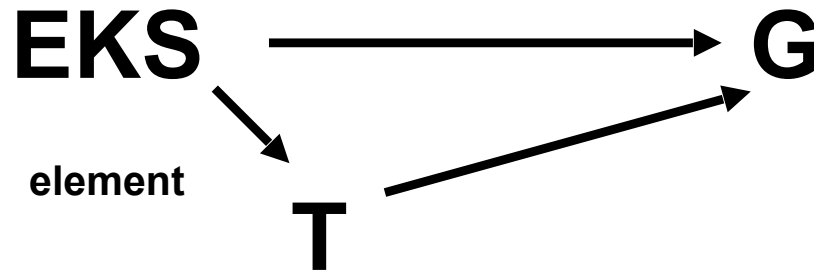
Process for the solution of the task.

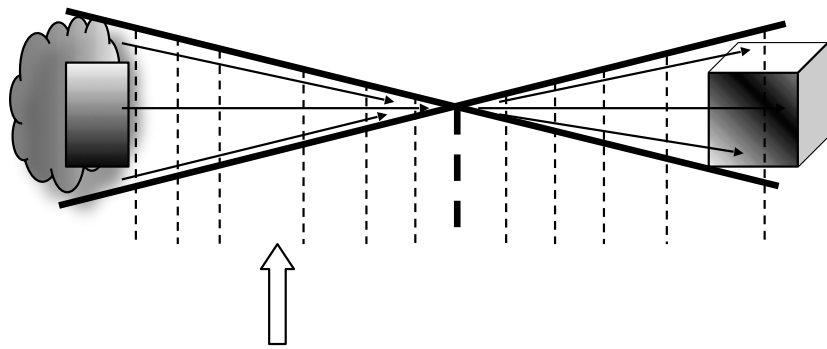
Using ARIZ-85V



Step 1.6.

Eks-element must to help tanks to move all gas.





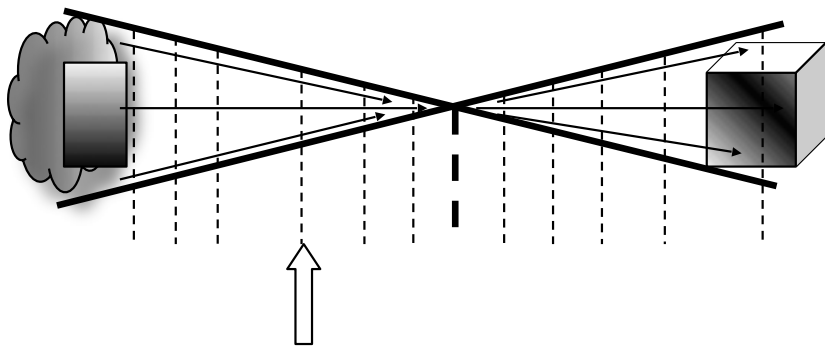
**Process for the solution of the task.**

**Using ARIZ-85V**

**Step 1.7.**

**System of Standards-77 not use for this education ARIZ-process.**

**(...)**

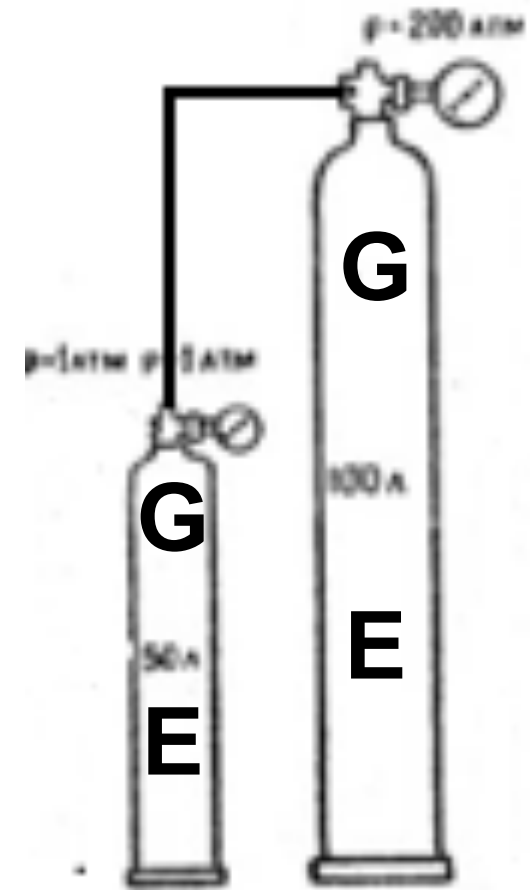


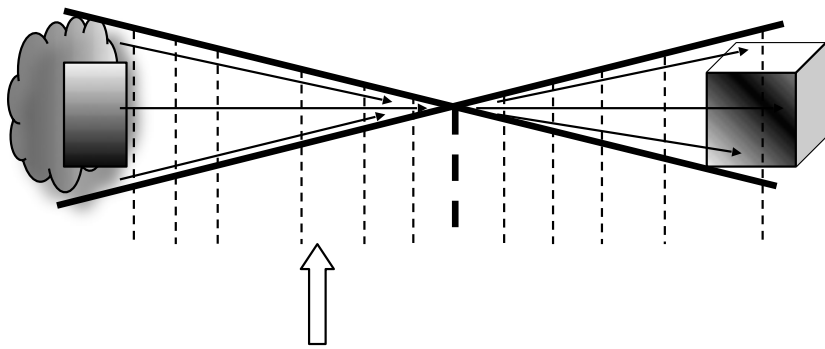
Process for the solution of the task.

Using ARIZ-85V

Step 2.1.

Operative Zone – all space inside tanks





Step 2.2.

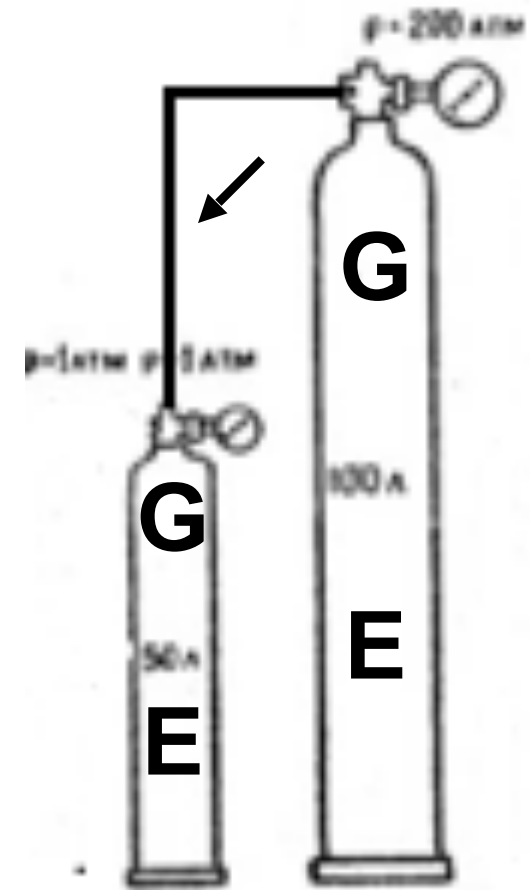
**Operative Time:**

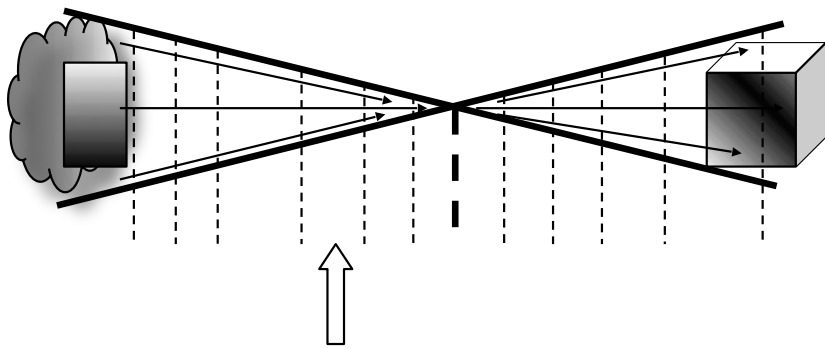
**T1** – all time of moving of the gas.

**T2** – time before moving.

Process for the solution of the task.

Using ARIZ-85V





Process for the solution of the task.

Using ARIZ-85V

Step 2.3.

Resource of «Substances» and «Fields» :

1a. A space inside of the tanks.

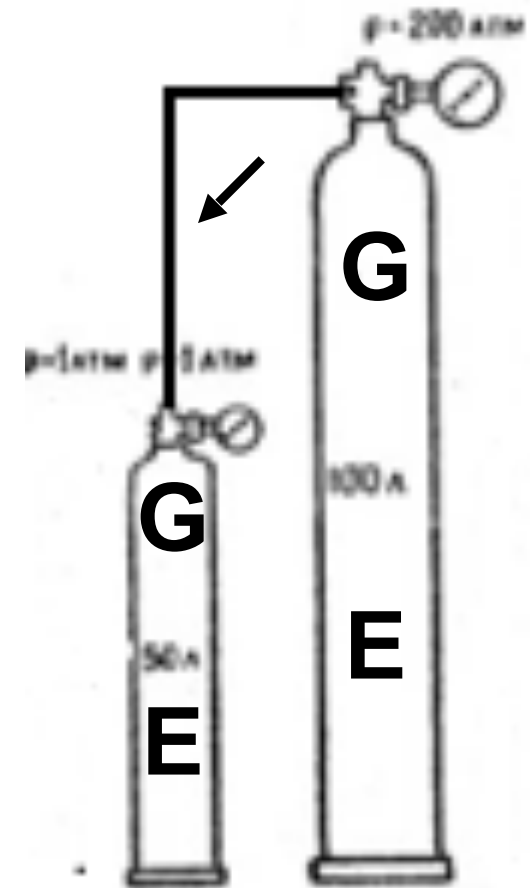
1b. A pressure of the gas.

2a. (...)

2b. The gravity field.

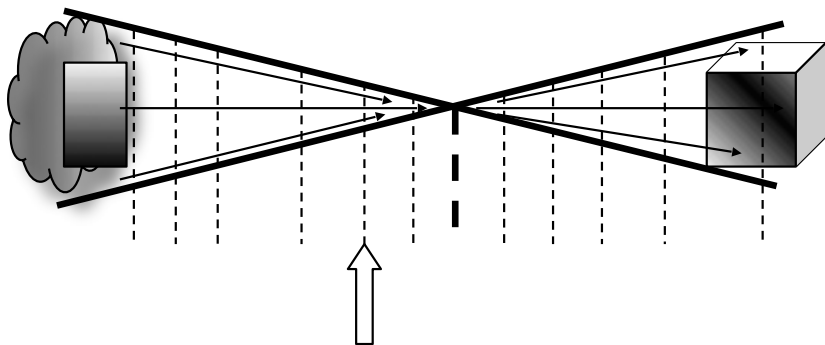
3a. (...)

3b. Very cheap the liquid (and solid) substances outside system: water, sand etc.



**Process for the solution of the task.**

**Using ARIZ-85V**



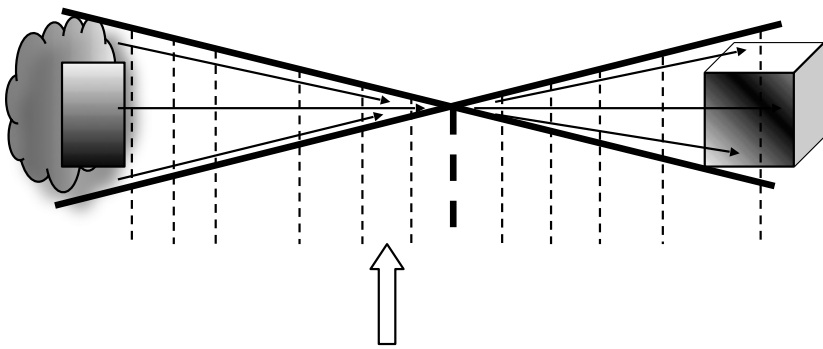
**Step 3.1.**

**IFR-1**

**Eks-element (with simple system and without new harmful actions) in the OZ and during OT help moving all gas.**

**Process for the solution of the task.**

**Using ARIZ-85V**

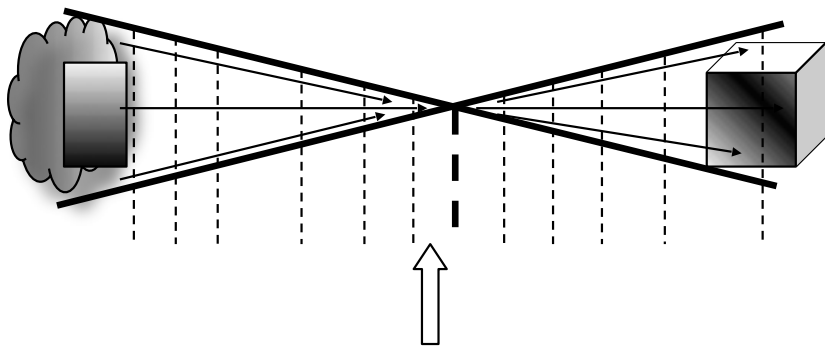


**Step 3.2.**

**IFR-1 (Amplified)**

**In the OZ is present gas and EKS-element**

**Eks-element is very cheap the liquid (or solid) substances from outside system (water, sand etc) and the gravity field.**



**Process for the solution of the task.**

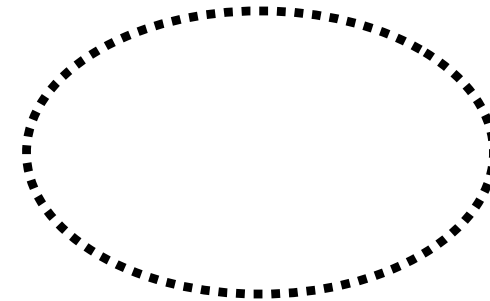
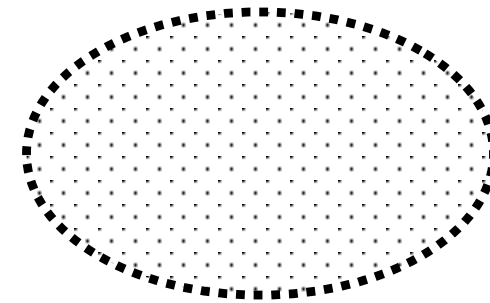
**Using ARIZ-85V**

**Step 3.4.**

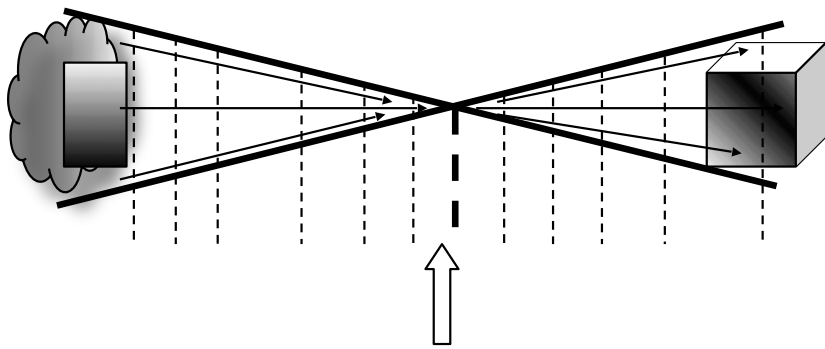
**PhC (micro)**

**The particles of «substance» in the OZ must to be.**

**The particles of «substance» in the OZ must not to be.**







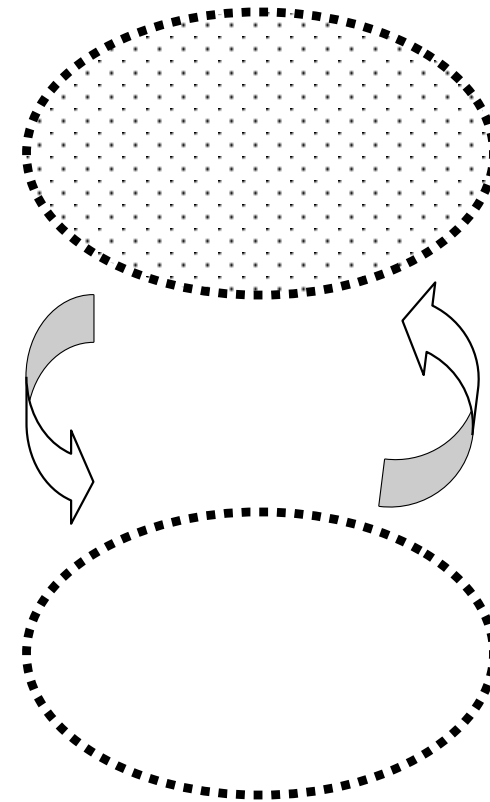
**Process for the solution of the task.**

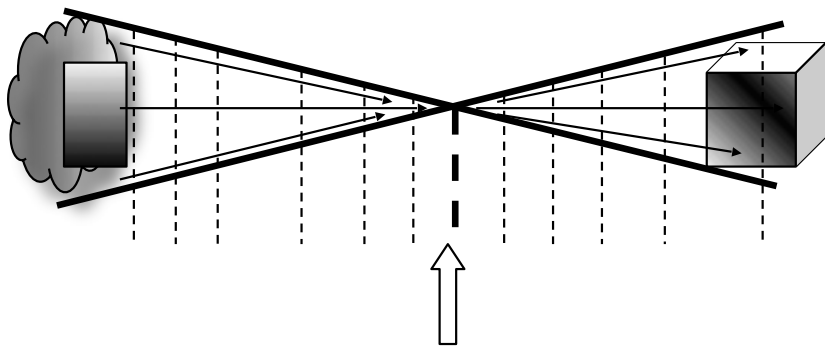
**Using ARIZ-85V**

**Step 3.5.**

**IFR-2**

**OZ must itself create and remove this particles.**





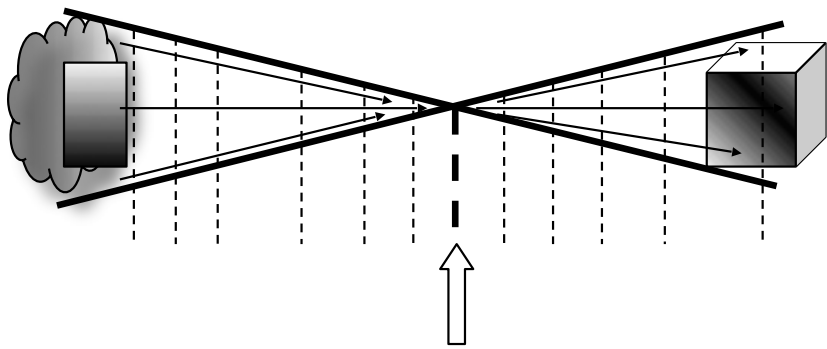
**Process for the solution of the task.**

**Using ARIZ-85V**

**Step 3.6.**

**System of Standards-77 not use for this education ARIZ-process.**

**(...)**

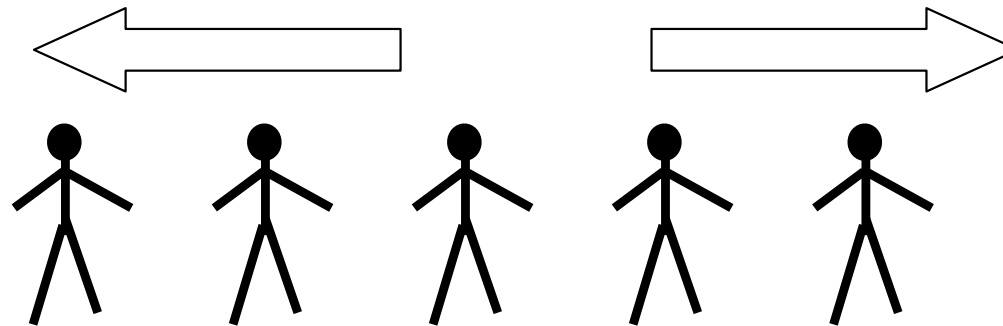


**Process for the solution of the task.**

**Using ARIZ-85V**

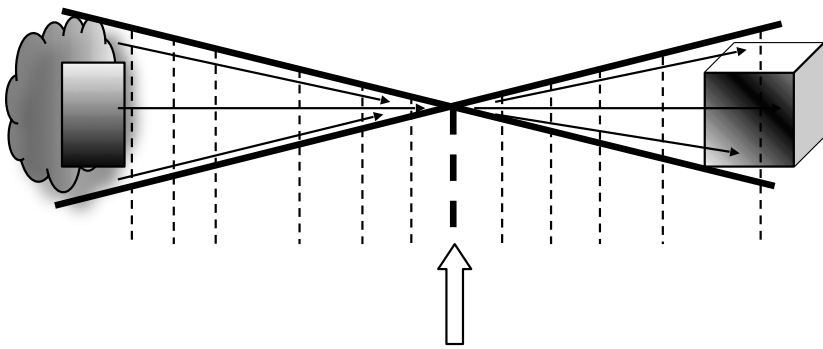
**Step 4.1.**

**Before**



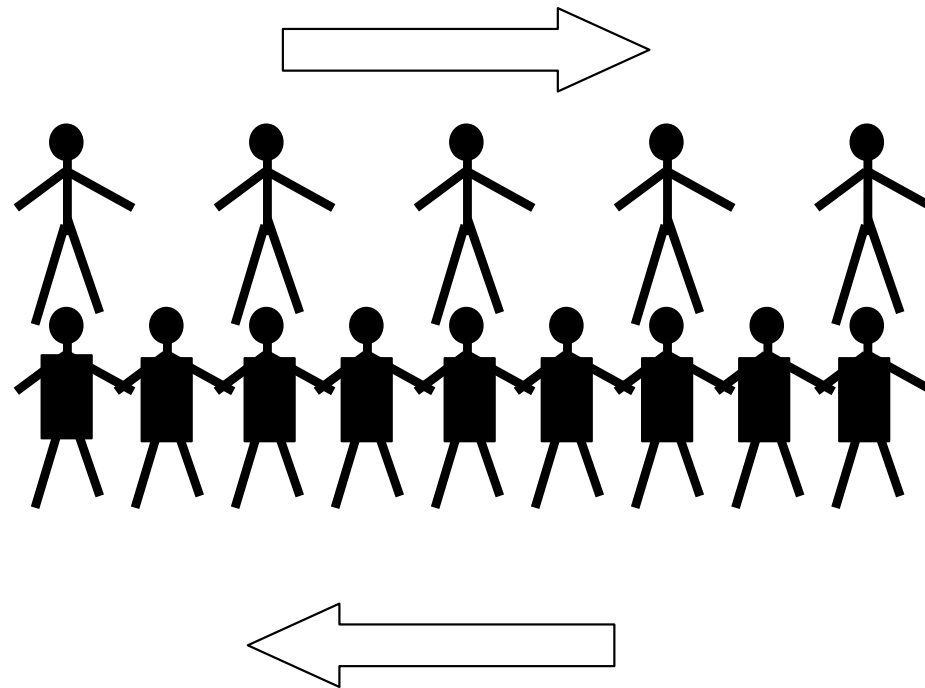
**Process for the solution of the task.**

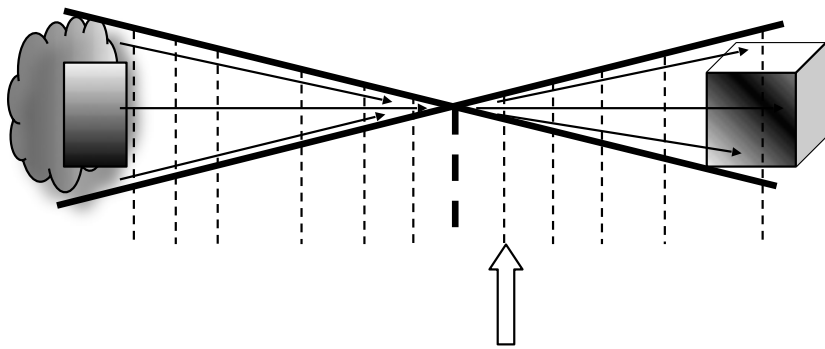
**Using ARIZ-85V**



**Step 4.1.**

**After**





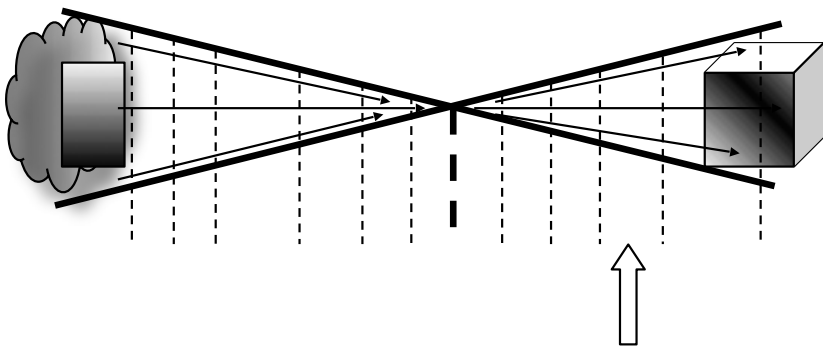
**Process for the solution of the task.**

**Using ARIZ-85V**

**Step 5.1.**

**System of Standards-77 not use for the education ARIZ-process.**

**(...)**

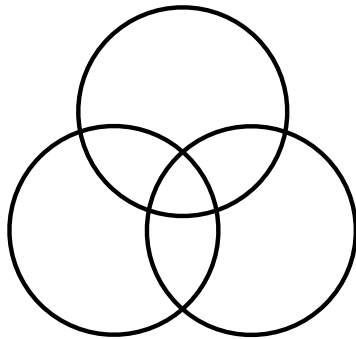


**Step 7.2.**

**Control questions**

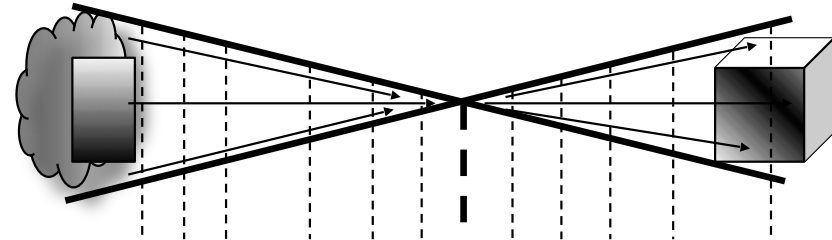
1. IFR – (...)
2. PhC – (...)
3. Control element – (...)
4. Many cycles – (...)

System of the Information Funds



The Vepol Models

Laws of Development  
of Systems



**TRIZ is exact science.  
G.S.Altshuller.**

**ARIZ is the instrument for thinking,  
but not instead of thinking.  
G.S.Altshuller.**