Centrifugal spiral for the separation of gas or liquid molecules.

Subject of the invention. A centrifugal spiral for the separation of gas or liquid molecules is a device that allows for cheap and effective separation of heavier particles from gas or liquid. The device according to the invention can be used for the separation of dioxide carbon from the air or industrial exhaust gases. Also, according to the invention it may be used for desalination of sea water, as well as for purification of drinking water from any contaminants such as heavy metals or heavy water D2O. Centrifugal spiral for separation gas or liquid particles, can be used in a wide range of industrial processes, where there is a need to separate gas or liquid molecules that are different from each other molar mass.

State of the art. Nowadays there are various types of centrifuges and filters in the world for separation of particles from gas or liquid. Both of these technologies are relatively expensive and inefficient compared to the centrifugal spiral according to the invention.

The essence of the invention. A centrifugal spiral for the separation of gas or liquid molecules is constructed from a cylindrical body with a separated spiral channel on its inner side, through which the gas or liquid undergoing the separation process flows. Inside the body there is a cylindrical sleeve, the outer surface of which forms the inner surface of the spiral channel. The outer surface of the sleeve and the inner surfaces of the spiral channel separated in a cylindrical body, are ground and polished to obtain the best smooth surface, which will eliminate the possibility of micro turbulence that could occur and disturb the proper separation process. The coils of the spiral channel 2 in the range of its location have the same angle of inclination to eliminate the possibility of the occurrence of turbulence that would disturb the correct separation process.

The inlet of the spiral channel is connected to the intake manifold, while the outlet of the spiral channel is connected to the exhaust manifold, which has two outlet channels, of which the first one - located closer to the axis of the device, discharges the lighter gas or lighter liquid, while the channel placed farther from the axis of the device, removes heavier gas or liquid particles that during in the separation process under the influence of centrifugal force, they accumulate in those furthest from the axis device, spiral channel areas. The wall separating both channels of the exhaust manifold has a sharp edge to prevent turbulence and to achieve the most effective separation process.

The shape of the cross-sectional area of the intake manifold channel is the same as the shape of the cross-sectional area of the spiral channel, as well as the shape of the cross-sectional area of the exhaust manifold channels on the side of the spiral channel, inscribed in the shape of the cross-

sectional area of the spiral channel, taking into account wall separating both outlet channels. The exhaust manifold may have more outlet channels separated by walls where the device according to the invention could, for example, select contaminated water into: water with particles lighter than water, clean water and water with particles heavier than water.

During operation of the device according to the invention, using the example of the separation of gas molecules, the gas stream pumped by the fan enters the intake manifold with an appropriate speed to the spiral channel, where heavier particles are placed under the influence of centrifugal force, they tend to accumulate in the parts of the channel furthest from the device axis spiral. At the outlet of the spiral channel, the separation process reaches its highest value and the gas flowing into the channels of the exhaust manifold is separated.

During operation of the device according to the invention, using the example of the separation of liquid particles, liquid stream pumped by the pump, through the intake manifold reaches the appropriate speed to the spiral channel, where heavier particles are placed under the influence of centrifugal force, they tend to accumulate in the parts of the channel furthest from the device axis spiral. At the outlet of the spiral channel, the separation process reaches its highest value and liquid flowing into the exhaust manifold channels is separated.

To obtain the appropriate operating efficiency of the device according to the invention, it is necessary to use: appropriate gas or liquid flow rate, appropriate number of turns of the spiral channel and appropriate diameter of the device. It should be pointed out here that the higher the medium flow speed, the more energy should be involved in the operation of the device, but at the same time we obtain greater efficiency of the device according to the invention. Preliminary calculations have shown that the energy cost of separating 1 ton of carbon dioxide from atmospheric air is approximately about 20,- $. However in the case of industrial exhaust gas separation the energy cost is even lower.

Apart from the pump or fan, i.e. external devices necessary for the operation of the device according to the invention, the centrifugal spiral according to the invention itself does not have movable elements that could wear out, thanks to which the device according to the invention can function characterized by great reliability and long service life.

The centrifugal spiral according to the invention should be fixed in place to the ground and should be leveled to avoid the gyroscopic effect which could generate turbulence of flowing gas or flowing liquid.

Implementation example. Centrifugal spiral for separating gas or liquid particles, is shown in an embodiment where from the inner side of the cylindrical body 1, a spiral channel 2 has been separated, through which the gas or liquid undergoing the process flows separation. Inside the body 1 there is a cylindrical sleeve 3, the outer of which the surface forms the inner surface of the spiral channel 2. The outer surface of the sleeve and the inner surfaces of the spiral channel 2 separated in the cylindrical body 1 are sanded and polished to obtain the best possible smoothness, which will eliminate the occurrence of possible micro turbulence that could disturb the proper separation process. The coils of the spiral channel 2 in the range of its location have the same angle of inclination to eliminate the possibility of the occurrence of turbulence that would disturb the correct separation process.

The inlet of the spiral channel 2 is connected to the intake manifold 4, while the outlet of the spiral channel 2 is connected to exhaust manifold 5, which has two outlet channels 6 and 7, the first of which is 6 is closer to the axis of the device discharges lighter gas or lighter liquid, while channel 7 located further from the axis of the device removes heavier gas or liquid particles, which during the separation process under the influence of centrifugal force, they accumulate the most areas of the spiral channel 2 away from the axis of the device, with wall 8 separating both channels of the exhaust manifold 5 has a sharp edge to not to cause turbulence and to obtain the most efficient separation process.

The shape of the cross-sectional area of the channel is 4` intake of manifold 4, is the same as the shape of the cross-sectional area of the spiral channel 2 and the shape of the cross-sectional area of channels 6 and 7 of the exhaust manifold 5 on the channel side spiral 2 inscribed in the shape of the cross-sectional area of the spiral channel 2, taking into account wall 8 separating the two outlet channels 6 and 7. The outlet manifold 5 being able to have more outlet channels separated by walls, where the device according to of the invention, could, for example, select contaminated water into: water with molecules lighter than water, pure water and water with molecules heavier than water.

The centrifugal spiral according to the invention should be fixed in place to the ground and should be leveled to avoid the gyroscopic effect which could generate turbulence of flowing gas or flowing liquid.

Explanation of figures in drawings.

Fig. 1 - shows the device in a three-dimensional drawing with a partial cross-section showing its interior. Fig. 2 - Shows the device in the drawing three-dimensional with a partial cross-section, without an internal sleeve, showing the spiral channel. Fig. 3 - Shows the device in a three-dimensional drawing from the outside. Fig. 4 - Shows the device in a three-dimensional drawing with a partial cross-section, showing the intake channel of the intake manifold and the outlet channels of the exhaust manifold. Fig. 5 – Shows an example cross-sectional shape of a spiral channel. Fig. 6 - Shows an example cross-sectional shape of the intake manifold channel. Fig. 7 – Shows an example cross-sectional shape outlet channels of the exhaust manifold on the side of the spiral channel.

Advantages of the invention device.

A centrifugal spiral for the separation of gas or liquid particles/molecules is a device that allows for cheap and effective separation of heavier particles from gas or liquid. The device according to the invention can be used for the separation of dioxide carbon from the air or industrial exhaust gases, which is a very desirable feature at the moment. The device according to the invention can be used to desalinate sea water, as well as to purify drinking water from any contaminants such as heavy metals or heavy water D2O, which is also a very desirable feature at the moment. Centrifugal spiral for separation gas or liquid molecules, can be used in a wide range of industrial processes in which there is a need to separate gas or liquid molecules that differ in molar mass. An example is the recovery of gold from seawater, where two devices with a capacity of 12 liters of water per second can separate approximately 1,000,000 liters of water per day. This amount of seawater contains about 11 grams of gold, which can be separated using the centrifugal spiral according to the invention. It should also be added that the centrifugal spiral to separation of gas or liquid molecules, can be designed in versions intended for sewage treatment plant.