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# A LAUNCH PAD FOR STARTUPS AND RESEARCHERS (ADVANTAGES OF REGULATING ARTIFICIAL INTELLIGENCE FOR INNOVATIVE TECHNOLOGIES AND INDUSTRIAL USE)

***Summary.*** *The European Union has adopted the world's first law regulating artificial intelligence (AI), classifying AI risk levels into four categories: minimal, limited, high, and unacceptable. The law prohibits systems of "unacceptable risk," such as subconscious influencing systems, social scoring, and emotion recognition. This article examines the benefits of implementing the new legislation for startups and research groups. Special attention is given to the application of innovative technologies, such as foam generators, in industrial processes to enhance efficiency and reduce energy consumption.*

***Key words:*** *Artificial Intelligence, regulation, innovation, startups, European Union, foam generators, resource conservation, industrial cleaning, environmental safety.*

**Introduction.** Regulating artificial intelligence (AI) has become a crucial step in ensuring its safe and ethical use. The European Union's adoption of the world's first AI regulation law has opened new opportunities for startups and

researchers, providing them with a launch pad for innovation. This historic step supports a balance between fostering technological advancements and minimizing societal risks.

**Problem Statement.** The current challenges associated with AI development require a comprehensive approach to its regulation. While AI usage presents significant opportunities for innovation, it also introduces risks such as human rights violations, data security concerns, and discrimination. Particularly challenging is the integration of innovative solutions, such as foam generators, into industrial processes. These technologies demand adaptation to modern regulatory requirements and further evaluation of their effectiveness.

**Objective.** The study aims to analyze the impact of new legislative norms on the development of startups and research groups, as well as to explore the potential of innovative technologies, such as foam generators, in solving industrial problems with an emphasis on environmental safety and resource conservation.

**Materials and Methods.** Study materials include:

1. Legislative acts of the European Union.
2. Scientific publications and patents on innovative technologies.
3. Data on the use of foam generators.

**Research methods.**

1. Analysis and synthesis: Review of legislative acts and scientific sources.
2. Modeling: Development of foam generator application schemes.
3. Theoretical generalization: Formulation of approaches for integrating technologies into industry.

**Review of Recent Studies and Publications:** The EU legislation represents the first comprehensive approach to AI regulation. Scientific publications emphasize the importance of foam generators for water treatment and liquid processing. Research indicates that these devices significantly reduce energy consumption.

**Results:**

1. AI regulation fosters industrial innovation.

2. Foam generators demonstrate versatility: cleaning, cooling, and liquid saturation.

3. Concepts for adapting technologies to enhance energy efficiency have been developed.

A dedicated section addresses consumer rights, allowing complaints about improper AI functioning. Violations incur penalties.

"This is a historic achievement and a major milestone for the future! In this endeavor, we managed to preserve an exceptionally delicate balance: promoting innovation and AI deployment across Europe," stated the EU Commissioner.

The law's text must still be ratified before it takes effect, expected by 2026, though some aspects will be implemented earlier.

An example of an innovative tool proposed by the author for implementation is aerodynamic foam generators, used in innovative manufacturing processes.

Foam generators (or agitators) solve numerous industrial problems and therefore have a wide range of applications. The device produces a rapid liquid stream that escapes at high speed with high kinetic energy. This creates highly turbulent and powerful micro-bubble action in the medium where the device is submerged.

Foam Generator (or Activator) Overview

The foam generator (or activator) operates aerodynamically or hydrodynamically, depending on whether the active fluid is compressed gas or pressurized liquid. Its modular and mobile design makes it highly flexible and adaptable for various industrial applications.

The device consists of multiple foam generators (or activators) arranged specifically based on the size and shape of the target object. The shape and size of the foam generators can also be customized to match the working surface. The

tube on which the foam generators are mounted can be rigid or flexible and is available in various configurations, allowing the device to operate effectively in confined spaces such as pipes and narrow tubes.

Fast-acting liquids have numerous industrial applications in cleaning, rinsing, and mixing processes. When used for rinsing or cleaning, the device can be applied to a localized area or cover a broader surface, depending on application requirements. Its lightweight and maneuverable design allows it to be operated manually or automatically, targeting specific working surfaces or objects. For larger surfaces, an assembly of multiple foam generators can be deployed to cover wide areas simultaneously.

The device's active power is concentrated at the head, delivering precise performance where it is most needed. As a result, significantly less active fluid is required, reducing energy and time consumption. Another benefit is that the intense aeration raises the water level, requiring less liquid to submerge the object. When combined with specialized water treatment equipment, the foam generator can act as an efficient cleaner, dispensing low-pH water with disinfectant and cleansing properties. Furthermore, this type of high-turbulence acidic water effectively removes mineral deposits from submerged surfaces.

When used as a mixing device, the activating action serves as a highly efficient mixing agent, making it suitable for treating industrial wastewater containing various contaminants. Its aerodynamic action "activates" water, facilitating sedimentation and subsequent filtration processes. Activated water also enhances the environment for chemical reactions, making it ideal for applications in laboratories, pharmaceuticals, cosmetics, and other industries.

Given its flexibility, maneuverability, and broad applicability, the foam generator (or activator) proves to be an indispensable tool in today's diverse industrial landscape.

**Advantages of the Foam Generator**

1. **Efficient Performance**

   The turbulent power of the foam generator is focused locally rather than dispersed across the immersion tank. This ensures minimal use of active fluid, reducing energy and time consumption.

2. **Full Control**

   The device allows precise control of where and how much active power to apply. It can target heavily affected areas or cover an entire working surface evenly. A flow control valve, operable manually or automatically, provides additional regulation. For instance, in automated systems, the generator can be mounted on a robotic submersible manipulator and activated only when the object is submerged.

3. **Modular Design for Easy Configuration**

   The system comprises multiple foam generator heads mounted on a tube. Both the heads and the tube can be arranged in limitless configurations to suit the working surface's size and shape. This flexibility makes it ideal for hard-to-reach areas, such as pipes and narrow tubes. The design also allows for easy adjustments to meet changing process requirements.

4. **Simple Assembly and Installation**

   All components are connected using threaded joints that are easy to assemble. The unit comes with a flexible hose featuring a standard fitting for quick connection to a compressed air source.

5. **Interchangeable Parts**

   All components are interchangeable and can be easily replaced by non-technical operators without special tools. This minimizes downtime and allows users to maintain the system independently with spare parts.

6. **Resistance to Corrosion and Extreme Temperatures**

   The components, including tubes and generator heads, are made from durable, non-corrosive materials such as polypropylene and PVC (or

stainless steel and titanium for food-grade applications). These materials resist chemically active substances and extreme temperatures, ensuring reliable performance in diverse applications.

7. **Seamless Integration with Existing Processes**

The foam generator can be connected to any functioning system with minimal modifications. It does not require significant redesign or reconfiguration of existing processes. In many cases, it can enhance and complement the current setup.

**Example Applications**

**1. Treatment of Liquids Containing Organic Materials Combined with Heavy Metals**

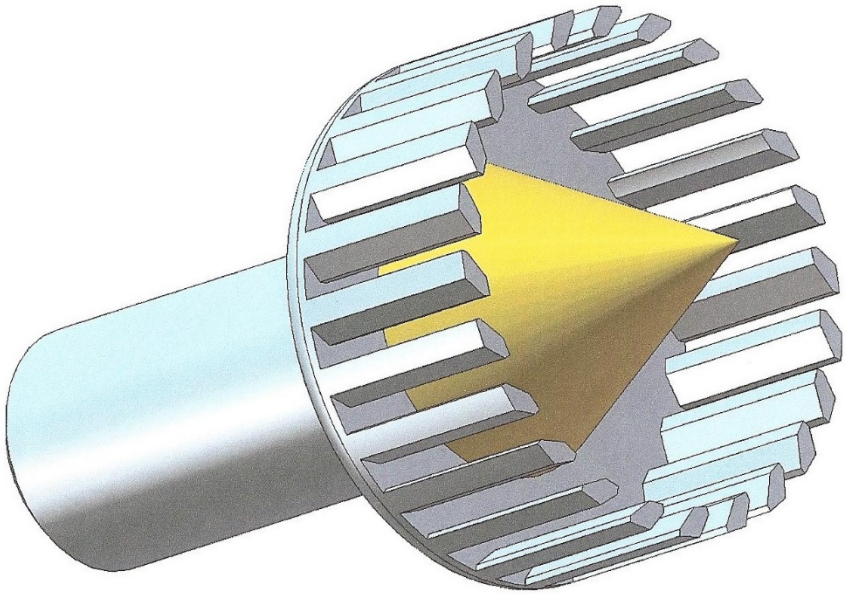

**Fig. 1. A variation of the foam generator with an external conical reflector**

For separating liquid into fractions with a high concentration of organic substances and liquid containing heavy metal ions, a combined treatment is applied. This method involves altering the properties and parameters of the generated foam by changing the pressure of the compressed air.

During the process, the foam separates the liquid with a high concentration of organic substances. Once the foam is removed, the remaining liquid predominantly contains heavy metal ions.

## 2. Treatment of Acidic Liquids Containing Heavy Metals and Organic Acids

These types of liquids typically contain complex contaminants (TSS, TDS, BOD, COD). To extract heavy metals, it is first necessary to separate the contamination fractions.

A combined treatment is applied for separating the liquid into fractions with a high concentration of organic substances and liquid with heavy metal ions. This process leverages the adjustment of compressed air pressure to modify the properties and parameters of the generated foam.

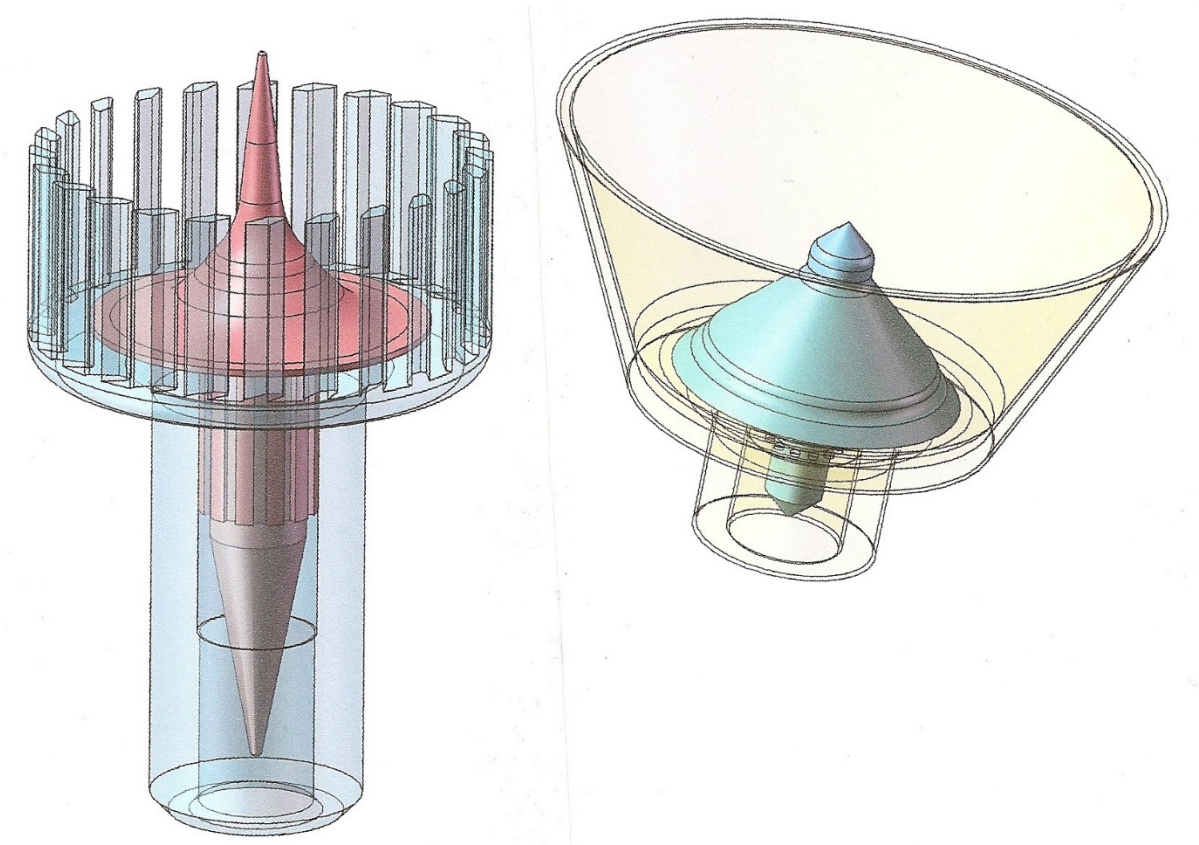

**Fig. 2. Variations of foam generators with different conical reflector designs.**

The foam separates liquid with a high concentration of organic substances. After the foam is removed, the remaining liquid predominantly contains heavy metal ions.

Additionally, the active and uniform air treatment promotes the initial formation of oxides, simplifying the subsequent processing of water or aqueous solutions.

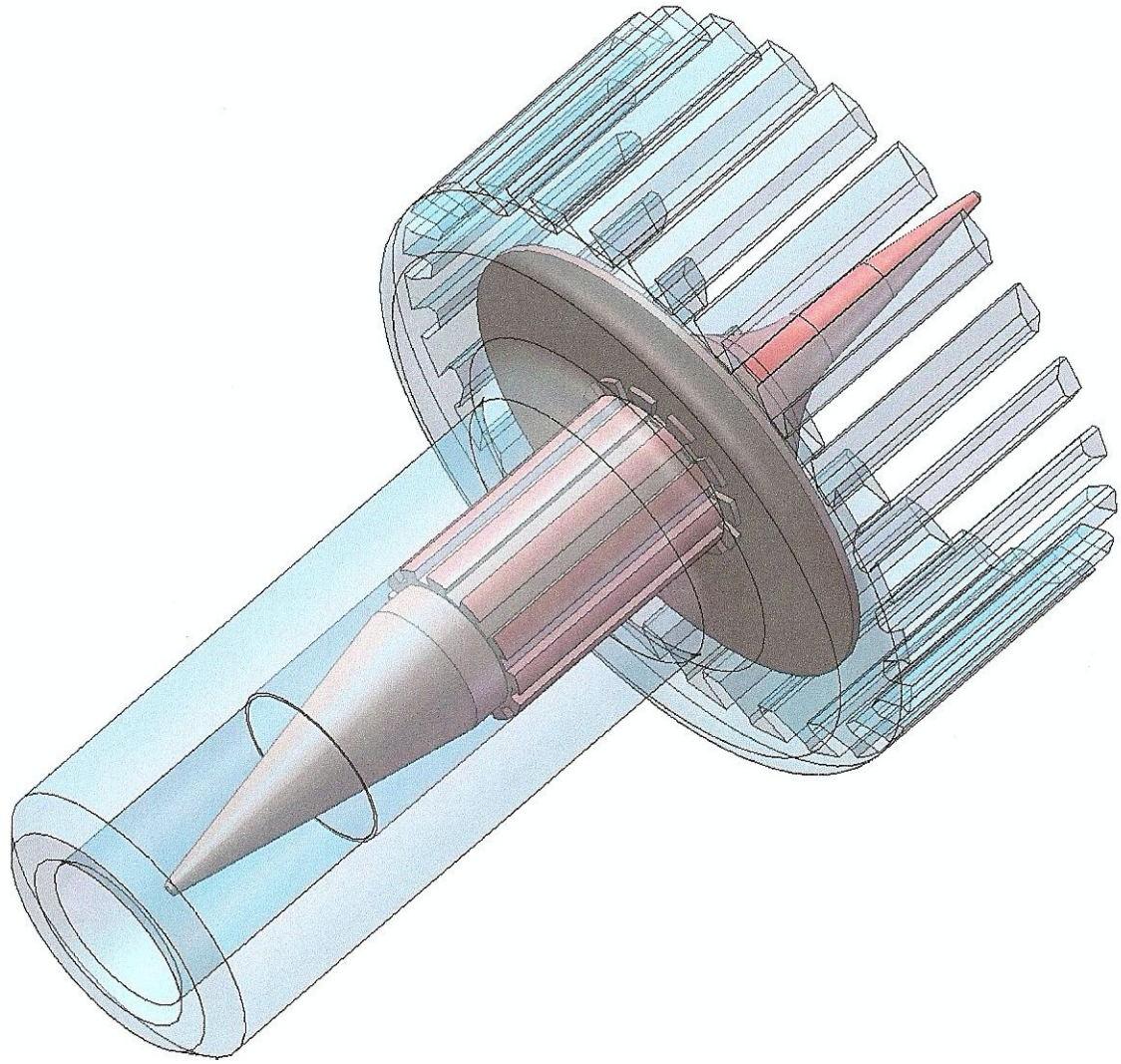

**Fig. 3. A variation of the foam generator with a distinctive conical reflector profile**

## 3. Treatment of Alkaline Liquids Containing Heavy Metals and Heavy Metal Salts

These liquids typically contain complex contaminants (TSS, TDS, BOD, COD). To extract heavy metals, it is necessary to first separate the contamination fractions.

A combined treatment is used to separate the liquid into fractions with a high concentration of organic substances and liquid containing heavy metal ions.

This process adjusts the properties and parameters of the generated foam by varying the pressure of compressed air.

The foam isolates the liquid with a high concentration of organic substances. Once the foam is removed, the remaining liquid predominantly contains heavy metal ions.

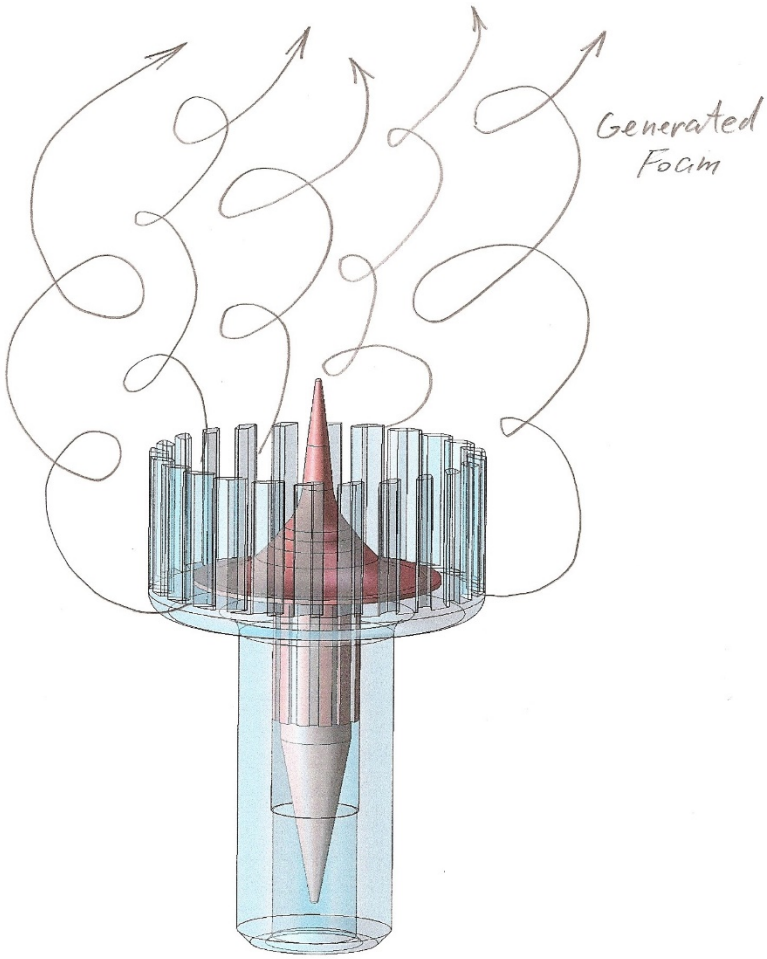


**Fig. 4. Schematics of the trajectories of generated foam movement**

## 4. Formation of Vortex Streams for Surface Cleaning

The creation of a vortex stream enables active cavitation on the surface being cleaned or washed. This significantly enhances cleaning efficiency, increasing it by 3–5 times while reducing water consumption for these operations by 1.8–2.5 times.

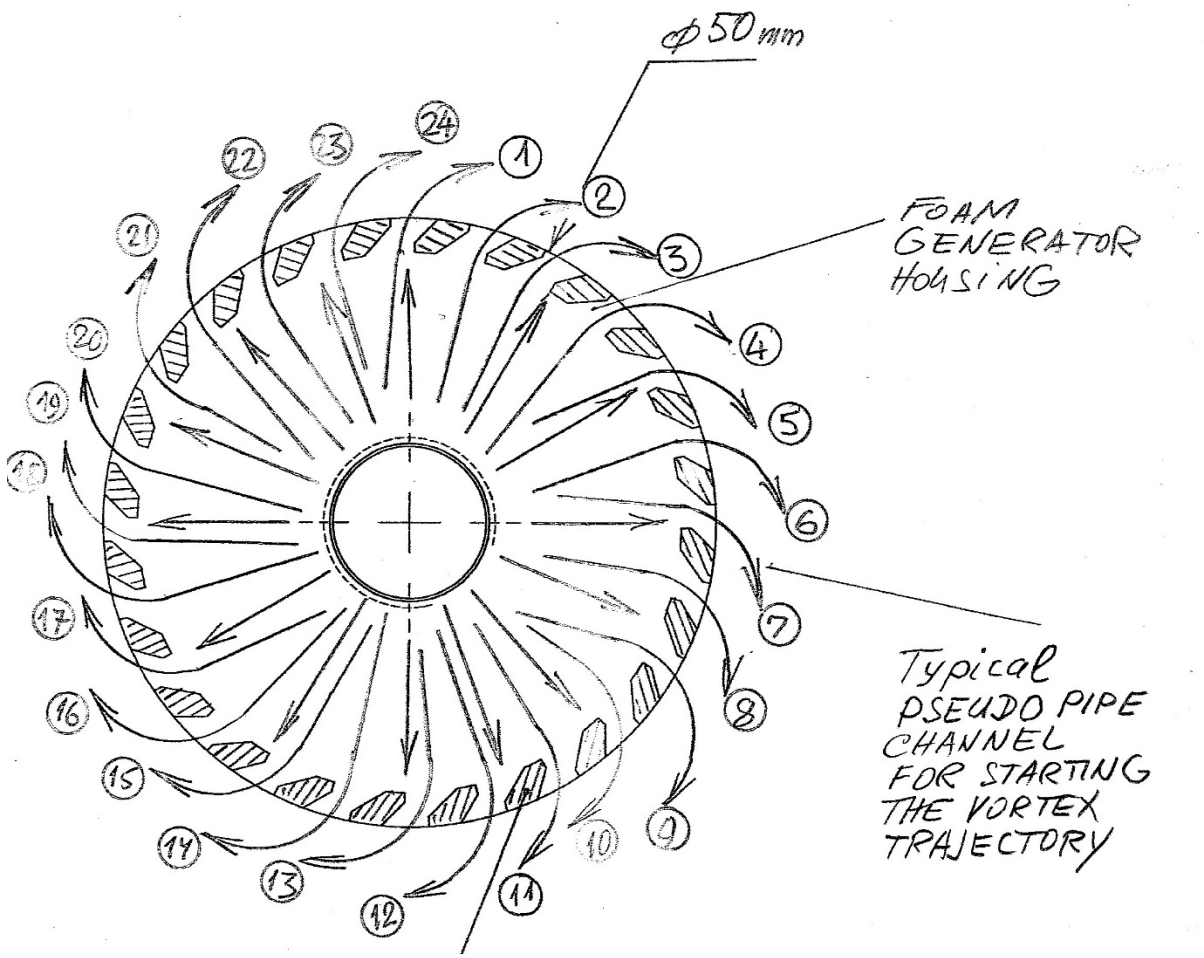


**Fig. 5. Schematics of the trajectories of generated foam in plan view:**

**1. Washing Pools for Large Parts**

Foam-generating devices (foam generators) are used to create a uniform regime of gas bubble formation, producing minimal bubble sizes and raising the liquid level in the pool during operation. This reduces the volume of water contaminated during the washing process by 25–35%.

**2. Gas Enrichment of Liquids**

Using foam generators or their structural equivalents increases the efficiency and lowers the cost of processes that enrich liquids with various gases. The foam generator technology allows real-time control over the geometry of compressed gas bubbles during the enrichment process.

**3. Cooling Rolled Metal in Metallurgy**

Water or aqueous solutions can be modified by introducing compressed gas bubbles (e.g., nitrogen) no larger than 25–50 microns in size. When

introduced, the gas lowers its temperature, and upon contact with the cooled surface and the bursting of the bubble shells, gas expansion occurs, resulting in enhanced cooling.

This process reduces energy costs for cooling by 2–3 times and significantly increases cooling efficiency. Additionally, cooling can occur simultaneously with washing or cleaning the cooled surfaces at the same energy expenditure.

**4. Conventional Flotation Technologies**

Foam-generating devices can be effectively used to produce uniform air bubbles. Process regulation is greatly simplified, requiring only adjustments to compressed air parameters. This reduces energy consumption significantly and improves cleaning quality.

**5. Combined Flotation with Dynamic Foaming**

Foam generators can be used for combined flotation processes. In the first stage, foam is formed under high air pressure (6–8 bar). After foam separation, the process continues under low pressure (0.5–1.5 bar) with the formation of a uniform stream of air bubbles.

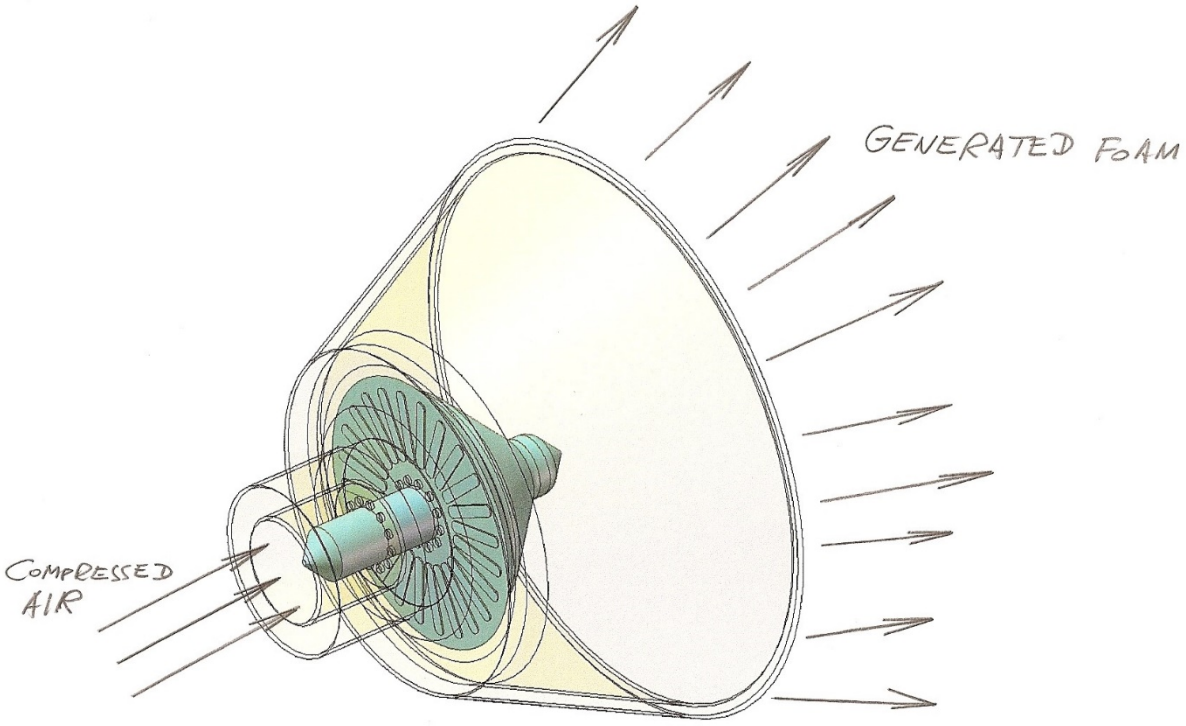


**Fig. 6. Technologies for Forced Separation of Liquid and Contaminants by Introducing Low Concentrations of Cleaning Agents**

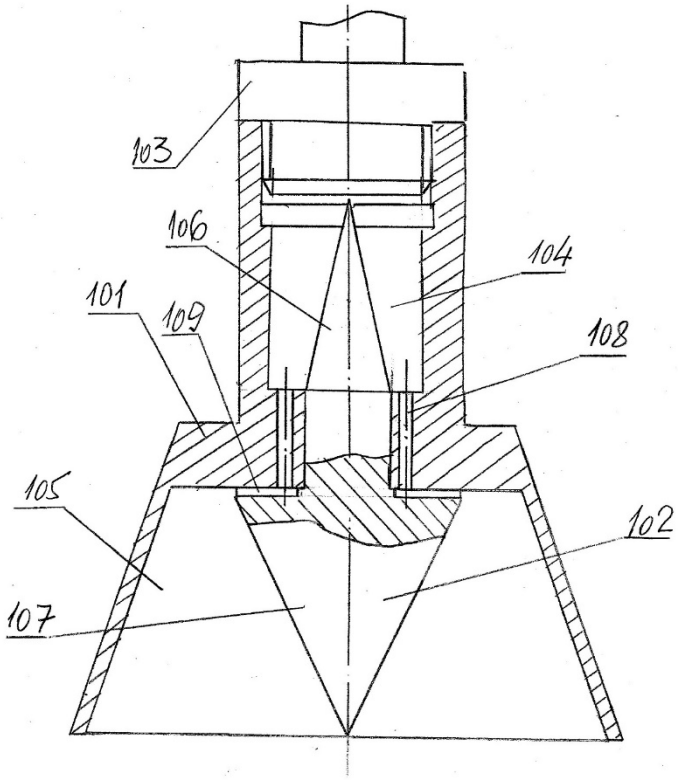


**Fig. 7. Technologies for Forced Separation of Liquid and Contaminants by Introducing Low Concentrations of Cleaning Agents**

In many cases, the liquid being cleaned does not contain foaming substances. In such instances, it is advisable to introduce a small amount of cleaning agents into the liquid (no more than 25 milligrams per liter of liquid being cleaned).

The active foam generated by the foam generator significantly reduces contaminant concentrations before transitioning the generator to producing air bubbles, thereby shifting to the mode of conventional flotation.

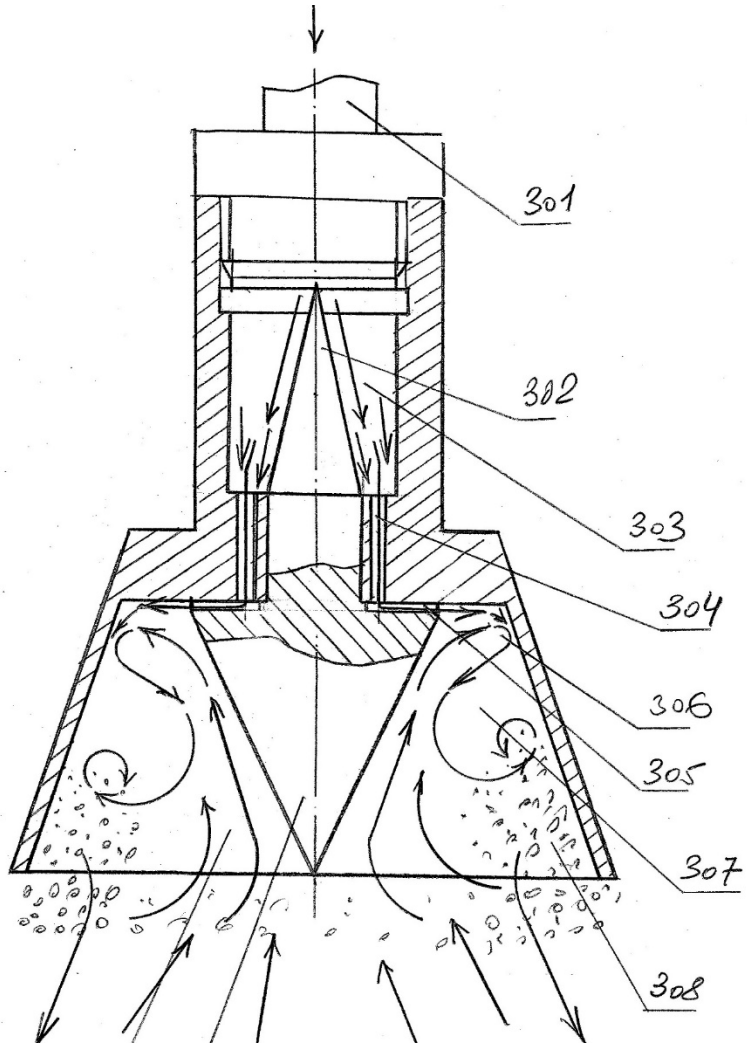


**Fig. 8. Technologies for Dynamic Mixing of Liquids with Different Properties**

When liquid, instead of air, is fed into the foam generator, and the output flow is introduced into another liquid, an efficient, homogeneous dynamic mixing process occurs. This method is 5–7 times more effective than mechanical mixing.

**1. Water-Saving Technologies for Process Baths**

The use of foam generators in various process baths creates a liquid level-raising effect, allowing the water or solution level to be lowered by 25–30%. This results in a 10–15% savings in process solutions, with minimal energy consumption for compressed air preparation.

**2. Technologies for Generating Fine Mist**

Above the vortex stream created by the foam generator, a mist forms, consisting of air bubbles encased in the liquid used in the generator. For precise and delicate cleaning technologies, mist treatment with a high cavitation effect—occurring as bubble shells rupture—is preferred. Effective mist generation requires air pressure of 7–8 bar, with flow rates determined by the volume of the liquid being treated.

**3. Treatment of Aqueous Solutions with High Levels of Contaminants**

This process is used for the preliminary treatment of aqueous solutions before electrochemical or other forms of processing.

The solution is foamed, concentrating contaminants in the foam. The more prone the contaminants are to foaming, the more efficient the treatment process becomes. Contaminants are removed along with the foam. Effective foam formation requires air pressure within 6–8 bar, with flow rates determined by the volume of the liquid being treated.

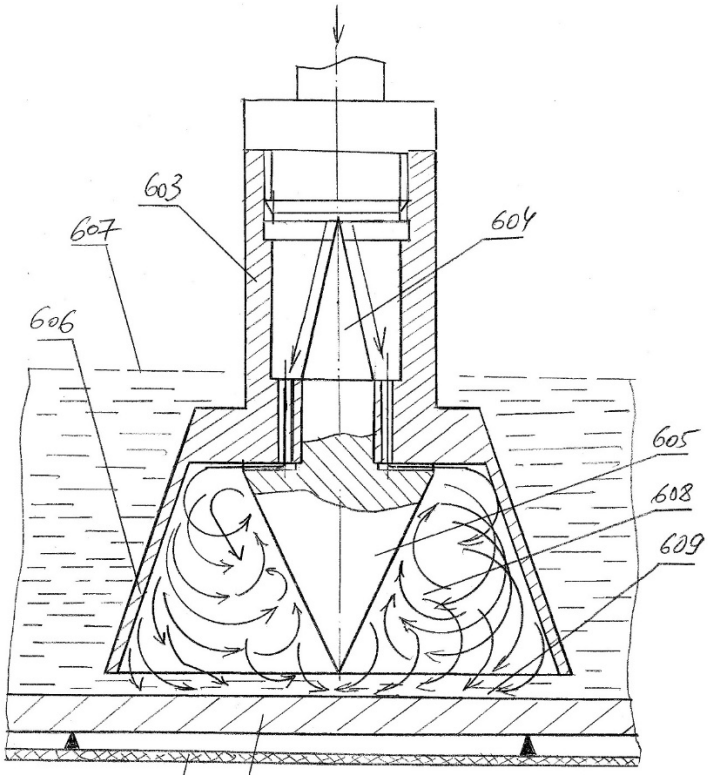


**Fig. 9. Treatment of Aqueous Solutions Containing Chemical Complexes**

This process is used for the preliminary treatment of aqueous solutions before electrochemical or other types of processing.

In this method, the solution is foamed, during which oxidation occurs for the solution and all its impurities. All impurities are incorporated into the foam since the water itself does not foam.

As the foam is continuously removed, the system eventually reaches a state where all foam-forming substances are eliminated from the solution.

Effective foam formation requires air pressure in the range of 6–8 bar, with the airflow rate determined by the volume of the liquid being treated.

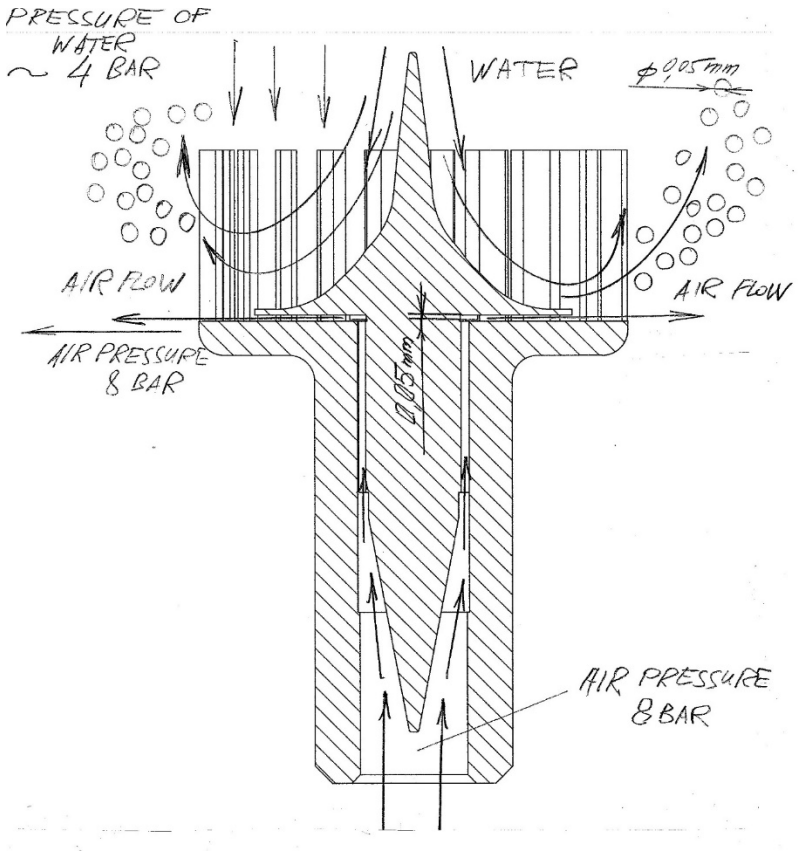


**Fig. 10. Working schematic of one variation of the foam generator**

## Prospects

Future research should focus on:

1. Developing methods to analyze the efficiency of these technologies.
2. Studying the impact of legislation on startup dynamics.
3. Deepening the understanding of foam generators' interaction with environmental regulations.

## Additional Descriptions

1. **Applications of Foam Generators:**
   - Efficient cleaning and energy reduction.
2. **Environmental Safety:**
   - Reduction of water pollution.
3. **Innovations for the Chemical Industry:**
   - Improvement of reaction processes.

## References, Patent, and Licensing Information

**Appendix 1**

**United States Patent** **9,375,023**
**Velasco Varo , et al.** **June 28, 2016**

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Sunflower oil with high heat stability

### Abstract

The invention relates to a ***sunflower oil*** with high heat stability, which is characterized in that between 15% and 45% of the fatty acid total are saturated fatty acids (palmitic acid and stearic acid), between 45% and 75% of the fatty acid total is oleic acid and more than 85% of the tocopherol total corresponds to the sum of gamma-tocopherol and delta-tocopherol. The invention also relates to ***sunflower*** seeds that contain an ***oil*** with the aforementioned characteristics and ***sunflower*** plants which as a result of self-pollination produce seeds with the aforementioned characteristics. In addition, the invention relates to the use of said ***oil*** in food and animal feed and for the formulation of bio-lubricants and biofuels.

**Appendix 2**

**United States Patent** **9,538,715**
**Gerdes , et al.** **January 10, 2017**

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Low saturated-fat sunflower and associated methods

### Abstract

Provided are sunflowers, parts thereof, cultures of, and seeds that are capable of producing ***sunflower oil*** that is low in saturated fat and, optionally, high in linoleic acid as well as associated methods.

**Appendix 3**

**United States Patent** **9,591,818**
**Gerdes , et al.** **March 14, 2017**

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Low saturated-fat sunflower and associated methods

**Abstract**

Provided are sunflowers, parts thereof, cultures of, and seeds that are capable of producing ***sunflower oil*** that is low in saturated fat and, optionally, high in linoleic acid as well as associated methods.

**Appendix 4**

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| **United States Patent** | **10,045,503** |
| **Gerdes , et al.** | **August 14, 2018** |

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Low saturated-fat sunflower and associated methods

**Abstract**

Provided are sunflowers, parts thereof, cultures of, and seeds that are capable of producing ***sunflower oil*** that is low in saturated fat as well as associated methods.

**Appendix 5**

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| **United States Patent** | **10,067,110** |
| **Yu , et al.** | **September 4, 2018** |

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Adulterated peanut oil detector and adulterated peanut oil detection method

**Abstract**

The present invention provides an adulterated peanut ***oil*** detector and an adulterated peanut ***oil*** detection method, and pertains to the technical domain of product analysis. The detector comprises a casing, a LCD and Return key, Enter key, Up key, Down key, a power switch, a power socket, and a USB interface arranged on the casing, and a microprocessor and a power supply unit mounted in the casing and electrically connected to the components on the casing, wherein, a module cover is arranged on the top surface of the casing, and a pretreatment module and a detection module are mounted in the space under the module cover. The pretreatment module comprises a heating body and cuvette slots, and the detection module comprises an axial fan, a radiating plate, a refrigerating plate, and cuvette slots. The detection method comprises sample preheating procedure and slow refrigeration procedure. The detector and method provided in the present invention can quickly and easily detect whether the peanut ***oil*** sample is adulterated and the percentage of adulteration, and is applicable to quick on-spot detection of rapeseed ***oil, sunflower oil,*** maize ***oil,*** cotton ***oil,*** palm ***oil,*** and soybean ***oil,*** etc. admixed in peanut ***oil***.

**Appendix 6**

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| **United States Patent** | **7,883,729** |
| **Kohler , et al.** | **February 8, 2011** |

Natural vegetable oil concentrated in unsaponifiable matters as food ingredient

**Abstract**

The invention concerns a natural vegetable ***oil*** selected among palm ***oil,*** corn germ ***oil, sunflower oil*** and canola ***oil,*** concentrated in unsaponifiable matters, such that said ***oil*** unsaponifiable matter content is 3 to 15% m/m. Said concentrated natural vegetable ***oil*** constitutes a novel food ingredient enriched in particular in vitamin E and phytosterol, useful as favored food source in vitamin E and phytosterol, meeting recommended daily intake.

**Appendix 7**

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| **United States Patent** | **7,785,645** |
| **Siew , et al.** | **August 31, 2010** |

Process for obtaining an oil composition and the oil composition obtained therefrom

**Abstract**

The present invention relates to a process of producing an ***oil*** composition by blending and fractionation steps and the ***oil*** composition obtained therefrom. The invention is directed to any vegetable oils such as palm ***oil,*** palm olein or palm stearin blends with unsaturated oils of soybean, corn, canola, rapeseed, ***sunflower oil,*** where the oleic content is more than 20% and the linoleic and linolenic contents are more than 30%. The new liquid ***oil*** is clear and is used as salad oils, cooking oils, etc. The stearins from such blends are of use in margarine and shortenings.

**Appendix 8**

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| **United States Patent** | **7,544,823** |
| **Velasco Varo , et al.** | **June 9, 2009** |

Sunflower seeds with high delta-tocopherol content

**Abstract**

The present invention relates to ***sunflower*** seeds which have been genetically modified through two artificial induction cycles of mutations followed in each case by processes for the identification of mutant individuals which have the desired character. The disclosed seeds are characterised in that they contain between 26% and 80% of the tocopherols as delta-tocopherol. This high delta-tocopherol production is determined by the genotype of the seeds which have been modified to this effect, and is always obtained independently of the culture conditions, thereby obtaining an inheritable character. Today, ***sunflower*** seeds producing such high levels of delta-tocopherol do not exist. Genetically modified ***sunflower*** plants which produce through self-fertilization seeds with high delta-tocopherol levels and the ***oil*** with high natural delta-tocopherol concentration, extracted from the seeds, are also objectives of the present invention.

**Appendix 9**

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| **United States Patent** | **7,569,712** |
| **Martinez-Force , et al.** | **August 4, 2009** |

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Plant, seeds and oil with increased saturated triacylglycerols content and oil having a high stearic acid content

**Abstract**

The invention relates to a ***sunflower*** seed, comprising ***sunflower oil*** having increased stearic acid content as compared to wild type seeds (preferably between 19.1 and 35% by weight related to the total amount of fatty acids in the ***oil*** and comprising in the ***oil*** at least 3.4% of the triacylglycerol species that have the general formula SMS and not more than 5-0% of triacylglycerol species that have the general formula SMM obtainable by treating parent seeds with a mutagenic agent during a period of time and in a concentration sufficient to induce one or more mutations in the genetic trait involved in stearic acid biosynthesis resulting in increased production of stearic acid, germinating the treated seeds and culturing progeny plants therefrom, collecting and analyzing progeny seeds, selecting seeds that have acquired the desirable genetic traits and optionally repeating the cycle of germination, culturing and collection of seeds. The invention further relates to ***oil*** extracted from the seeds, a method for preparing the ***sunflower*** seeds, a method for preparing such ***sunflower oil, sunflower*** plants produced from the seeds and use of the ***oil***.

**Appendix 10**

**United States Patent** **7,217,875**
**Osorio , et al.** **May 15, 2007**

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Sunflower seeds and oil having a high stearic acid content

**Abstract**

The invention relates to a ***sunflower*** seed, comprising a ***sunflower oil*** having an increased stearic acid content as compared to wild type seeds, obtainable by treating parent seeds with a mutagenic agent during a period of time and in a concentration sufficient to induce one or more mutations in the genetic trait involved in stearic acid biosynthesis resulting in an increased production of stearic acid, germinating the treated seeds and culturing progeny plants therefrom, collecting and analyzing progeny seeds, selecting seeds that have acquired the desirable genetic trait and optionally repeating the cycle of germination, culturing and collection of seeds. Preferably the seeds comprise an ***oil*** having a stearic acid content of between 19.1 and 35% by weight related to the total amount of fatty acids in the ***oil,*** and are obtainable by treating the parent seeds with an alkylating agent, such as ethyl methane sulfonate in water, or with sodium azide in water. The invention further relates to ***sunflower oil*** obtainable by extracting the ***sunflower*** seeds, to a method for preparing ***sunflower*** seeds having an increased stearic acid content as compared to wild type seeds, a method for preparing a ***sunflower oil*** having an increased stearic acid content ***sunflower*** plants produced from the seeds and the use of the ***sunflower oil*** in various products.

**Appendix 11**

**United States Patent** **6,977,328**
**Gerdes , et al.** **December 20, 2005**

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Sunflower seed having low saturated oil content

**Abstract**

A ***sunflower*** seed having an oleic acid content of greater than 88% and a total saturated ***oil*** content of between 6.0% and 7.3% is disclosed. The invention relates to ***sunflower*** seeds, to ***sunflower*** plants, and to methods of producing a ***sunflower*** plant.