2026

THE RAIN-MAKER

Method for Triggering Rain

After this method was applied, rain fell even in some of the driest regions of the world



Illustration shows a mobile ring-nozzle spray unit directly beside a body of water

Method, Technology, and Background
As of 2026

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Prologue – Why I Created This Documentation

About 25 to 30 years ago, I saw a television program that has stayed with me to this day. The program showed a team of researchers who had set up several metal pipes about six to nine meters high in a desert region. Very fine spray nozzles were located at the upper ends of these pipes. Water, possibly seawater, was pumped up through the pipes and finely atomized there. A large portion of the water evaporated while still in the air. After this method had been used for a certain time, the program showed that rain began to fall in the region in question. The simplicity of this approach impressed me greatly at the time.

For many years, this memory remained in the background. In recent years, however, it has taken on a new urgency for me. The increasing scarcity of rainfall and the increasingly prolonged periods of drought and heat – in Europe as well as in the USA – are causing me great concern. The year 2026 in particular, which according to observations to date could rank among the warmest and driest ever, has further intensified this concern. In spring 2026, the USA experienced the worst spring drought on record.[26] The large reservoirs Lake Mead and Lake Powell on the Colorado River have fallen to historic lows, and low water levels on the Mississippi have repeatedly hampered shipping and freight transport in recent years. Agriculture is suffering from parched soils and a lack of feed, forests and vegetation are under increasing drought stress, and the risk of wildfires is rising. The consequences have thus long since extended beyond nature to the economy, supply systems, and the population.[24, 31, 32]

Out of this concern, I recalled the television program from back then and began searching the internet specifically for comparable methods. In doing so, I came across the Swiss national Hans Hangartner and his “Method for Producing Rain.” To my surprise, I found indications that Hangartner had used his method very successfully over many years in various very dry regions of the world. I was particularly drawn to his 1988 trial in the Indian state of Gujarat, where, after years of drought, heavy rainfall began again during his stay.[3, 5, 6]

This discovery was what prompted me to compile the available information and create this documentation, “The Rain-Maker.” My aim is to present the method in an understandable way, document Hans Hangartner’s work and field trials, bring together historical sources and precipitation data, and at the same time show how a mobile test unit could be built today.

At the center of all this for me is a simple but important question: If such a method was used in some of the driest regions of the world and rain repeatedly began to fall afterward, why should it not also be tested and used in the USA under today’s climatic conditions? Since those experiments, both the climate and the technical and meteorological capabilities have changed considerably. In my view, we should therefore not dwell too long on the theoretical question of whether the method is possible or not. The decisive step would be to start the experiment under today’s conditions with scientific supervision and observe what actually happens. Only a practical field experiment can show what effect develops under real-world conditions. Should it turn out that the method works, its benefits for agriculture, forests, rivers, and water supply, and not least for combating global warming, could be of great significance. Who is not familiar with the exceptionally welcome cooling effect when sustained rain finally begins after a prolonged period of heat or drought? Within a very short time, ambient temperatures drop markedly, and not least, the previously intensely heated ground also cools noticeably. I could well imagine that this very method of “rain-making” could help not only to prevent periods of heat and drought by deliberately triggering rainfall, but also to counteract increasing global warming.

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Estimated reading time from Prologue to Conclusion and Outlook: approx. 18 minutes

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1. Introduction – Climatic Changes in the USA

The USA has been experiencing a noticeable shift in climate for several years. Droughts occur more frequently, last longer, and are accompanied by pronounced heat. Years such as 2012, 2022, and especially 2026 have shown how severely prolonged drought can affect agriculture, water supply, energy production, health, and the economy. According to the U.S. weather agency NOAA, the period from May 2025 to April 2026 was the warmest on record in the 48 contiguous states. In April 2026, almost 63 percent of the country was experiencing drought – the worst spring drought on record.[26, 27]

This development is particularly visible in the major rivers and reservoirs. The Colorado River supplies water to approximately 40 million people and irrigates more than five million acres (approximately two million hectares) of farmland.[30] Its two largest reservoirs, Lake Mead and Lake Powell, have fallen to historic lows; at the end of April 2026, Lake Powell was only about 25 percent full.[31] Arizona is again receiving 18 percent less water from the Colorado River in 2026 – with immediate consequences for irrigated agriculture.[30] On the Mississippi, which carries a considerable proportion of grain and soybean exports, historically low water levels in 2022 and 2023 led to severe restrictions on inland navigation, supply bottlenecks, and higher freight costs.[32]

Agriculture is also directly affected: In the Great Plains, the 2026 winter wheat harvest was the smallest since 1965, and the hard red winter wheat harvest was even the smallest since 1957.[28] When grass no longer grows sufficiently on pastures and meadows during dry periods, farmers and ranchers must purchase additional feed or reduce their livestock numbers – with consequences for prices. In Kansas, Oklahoma, and Texas alone, drought caused an estimated $23.6 billion in damage between 2020 and 2024.[29] Prolonged drought also increases the risk of wildfires: In spring 2026, the state of Georgia declared a state of emergency for 91 counties due to fires and drought.[26]

The electricity supply is also coming under increasing pressure. The large hydroelectric power plants on the Colorado River – Hoover Dam at Lake Mead and Glen Canyon Dam at Lake Powell – depend on adequate water levels. If Lake Powell falls below the minimum operating level, Glen Canyon Dam can no longer generate electricity; for Hoover Dam, the U.S. Bureau of Reclamation anticipates an additional loss of generating capacity of up to 40 percent.[31] Thermal power plants that draw cooling water from rivers and lakes must also reduce their output when water levels are low and water temperatures are high. During prolonged periods of drought and heat, electricity could therefore become scarce and more expensive.

Beyond the economy, the effects on the population also come into focus. According to the U.S. health agency CDC, approximately 2,300 to 2,400 heat-related deaths were recorded in the USA in each of the years 2023 and 2024 – primarily among older people. In Maricopa County around Phoenix, Arizona, alone, there were 645 deaths in 2023 and 602 in 2024.[33] During sustained heat, the risk of health complications increases significantly, particularly when the body and living spaces can no longer cool sufficiently even at night.

Against this background, the question of whether and how precipitation formation could be deliberately supported during dry periods is becoming increasingly important. Or would it even be conceivable to deliberately “produce” precipitation or rain during such dry periods? This documentation presents a method that has existed for decades but has never been systematically tested and used with scientific supervision:

The so-called “rain-making” method using a mobile spray-nozzle unit.

In simplified terms, the underlying principle can be described as follows: Moist air rises above the heated land and condenses into clouds at higher altitudes; the now drier air flows back toward the body of water and absorbs moisture there again. In short: To deliberately trigger rain, water – for example, from a lake, river, or sea – is evaporated to set the described cycle in motion and increasingly strengthen it. **One can imagine this process as a large, powerful engine: the method of deliberately triggering rain is the key that starts it.**

Particularly Affected Regions and States

Two forms of rainfall scarcity in the USA must be distinguished: chronic water scarcity in the naturally dry regions of the West and acute drought, meaning a marked precipitation deficit compared with the long-term average. In early November 2026, approximately 43 percent of the 48 contiguous states were experiencing drought; approximately 87 million people were affected, and 43 states were experiencing at least moderate drought.[24, 25]

Region	States	Type of Rainfall Scarcity and Consequences
Southwest and Colorado River Basin	California, Nevada, Arizona, Utah, New Mexico, Colorado, Wyoming	Chronic water scarcity; the driest states in the USA; reductions in Colorado River water allocations; irrigated agriculture producing fruits, nuts, and vegetables under pressure
Northern West	Idaho, Montana, Oregon, and Washington (east of the Cascade Range)	Recurring summer droughts; by contrast, the coastal areas of Oregon and Washington receive very high precipitation
Western Great Plains	West Texas, Oklahoma, Kansas, Nebraska, eastern Colorado, eastern New Mexico, North and South Dakota	Semiarid climate; overexploited Ogallala Aquifer; winter wheat and cattle farming; sixth consecutive year of drought in Texas and Oklahoma
Southeast	Georgia, North Carolina, South Carolina, Alabama, Florida	Record drought in 2026, with the driest September-to-March period since 1895; peanuts and cotton severely affected; wildfires
Lower Mississippi Valley and Midwest	Mississippi, Arkansas, Louisiana, Tennessee, Missouri, Kentucky, Illinois, Indiana	Rapidly intensifying drought in fall 2026; poor pastures and dried-up farm ponds; rice, cotton, and soybeans

Sources: U.S. Drought Monitor, Drought.gov, U.S. Bureau of Reclamation, among others.[24, 25, 29, 30, 35]

The agricultural regions most severely affected in 2026 were the Southern and Central Plains (Kansas, Oklahoma, Texas, Colorado, Nebraska), with winter wheat and cattle farming; the Southeast, with peanuts and cotton – in spring, 100 percent of peanut acreage was in drought areas[35] – and Arizona and California, with their irrigated agriculture along the Colorado River. At the end of October 2026, 50 percent of winter wheat acreage and 40 percent of cattle nationwide were still in drought areas.[34]

2. Origin of the Method – Hans Hangartner

The method presented here goes back to the Swiss national Hans Hangartner, born in 1921 as the son of a Swiss dairyman who had emigrated to Transylvania, Romania. At the age of twelve, he came to Switzerland with his family, where the family at times lived in great poverty. Hangartner worked in the mechanical engineering industry but was a self-taught tinkerer throughout his life, with a strong interest in natural phenomena.[4, 5]

According to his own accounts, he studied thermals, the physics of evaporation, weather maps, and wind and ocean currents intensively. By his own account, he received a decisive impetus in 1977 from insights into the physics of refrigeration in ice production, which led him to the basic idea of his later method.[4, 5]

On June 1, 1989, Hangartner filed patent CH 679 262 A5, entitled “Verfahren und Vorrichtung zum Bewirken von Regen” (“Method and Device for Producing Rain”), with the Swiss Federal Institute of Intellectual Property. The patent was granted on January 31, 1992. It describes both the method – evaporating seawater sprayed into warm, dry air to stimulate precipitation – and an associated, easily transportable device.[3]

Hangartner did not stop at simply filing the patent but tested his method in practice over decades – in some of the driest places in the world. His deployments took him to Morocco, Mauritania, Israel, Tunisia, Togo, Namibia, the West African Sahel region, and India, among other places. To the great joy of the population, rain actually began to fall afterward each time. Local experts consistently confirmed these precipitation events – although whether they could be causally attributed to the rain-maker experiment could not be conclusively established scientifically. What is certain, however, is this:

The rain fell, and the temporal connection between the experiment and precipitation remained striking and remarkable.[4, 5]

I do not know whether it was the experts’ recurring doubts about the effectiveness of his method that prompted Hans Hangartner in June 1988 to venture once again into the Indian state of Gujarat – a region that demonstrably experienced severe drought from 1985 to 1988 – to prove there once more that his method can actually produce rain. The correspondent of the Tages-Anzeiger who accompanied the experiment on site reported on July 27, 1988, that the first real rain in four years had fallen.[5, 6, 7, 8]

And yet the recognition he deserved eluded him throughout his life. For the fundamental problem has remained the same: Rain cannot be reproduced in a laboratory, and complete scientific proof that the precipitation was caused by the spraying experiment could never be provided. Meteorologists, scientists, and authorities repeatedly questioned the successes – not maliciously, but consistently: coincidence could never be ruled out.

What remains is the image of an extraordinary Swiss inventor who, with modest means and unwavering belief, used his method precisely in areas where others had long since given up – a man who, wherever he went, brought rain – and who nevertheless never succeeded in convincing the world that it was not a coincidence.

3. Field Trials and the Experiment in Gujarat, India (1988)

A field trial that Hangartner conducted in Jamnagar in the Indian state of Gujarat in early July 1988 deserves particular attention. Jamnagar is located on a peninsula in the Saurashtra district and at the time was affected by a drought that had already lasted four years and had hit the already poor and economically underdeveloped state hard (approximately 178,000 square kilometers – roughly the area of the U.S. state of Oklahoma – approximately 40 million inhabitants at the time). The deployment was accompanied by the then China and Asia correspondent of the Swiss newspaper Tages-Anzeiger, H. B., who documented the field trial on site as a journalist together with his wife.[6, 7, 8]

The deployment came about through the Indian industrial group Tata, which invited Hangartner to Gujarat. The trial took place in Jamnagar; Tata Chemicals operated a large production facility nearby. The engineers and chemists there initially watched the setup of Hangartner's equipment with undisguised skepticism.[6]

"With exuberant joy, the population celebrates the first real rain in four years."[6]
Tages-Anzeiger, July 27, 1988

As described in the article above, it actually began to rain about two weeks after Hangartner's arrival, on July 14, 1988. For this deployment, the Swiss man had again brought only his usual mobile equipment weighing approximately 150–180 kilograms – consisting of a compressor, high-pressure pipes, and hoses – with which he attempted each time to influence an area of several hundred square kilometers. Dried-up riverbeds filled with water within a short time, so that makeshift huts erected along the banks had to be hastily evacuated. While the initially skeptical Tata experts reacted with visible surprise, the people of Jamnagar celebrated the onset of rain exuberantly: young people let the rain soak them, children romped about, and women scooped water from the resulting puddles for cooking. Hangartner himself stated that he had never experienced anything comparable in his entire life. The sustained heavy rainfall eventually even forced him to postpone his return flight to Switzerland by two days.[6]



A tent, a "spray stand," and a compressor pump – and shortly afterward it rains for the first time in Gujarat, western India.



Historical spraying device used by Hans Hangartner in India in July 1988. The simple construction consisted of several elevated spray pipes and was used for the fine atomization of the water. [4]

The official precipitation statistics of the Indian weather agency for the affected regions also paint a clear picture:[7, 8]

Region	Jan. 1–Dec. 31, 1987	Jan. 1–June 30, 1988	After the experiment: July 1–Dec. 31, 1988
Saurashtra and Kutch	92.5 mm	14.9 mm	773.2 mm
State of Gujarat	405 mm	75.6 mm	1,094.3 mm

Source: India Meteorological Department, imdpune.gov.in (Subdivisional Rainfall Data).
https://imdpune.gov.in/cmpg/subdivrainfall/saurashtraandkutch.html (link takes approx. 30 seconds to open)
https://imdpune.gov.in/cmpg/subdivrainfall/gujaratregion.html[7, 8]

The temporal connection is remarkable: Until the end of June 1988, both regions continued to experience exceptional precipitation scarcity and drought, whereas immediately after the experiment a period of substantially higher precipitation followed in the second half of the year. Scientifically proving beyond doubt that this change was actually caused by the spraying experiment is inherently difficult – a fully controlled comparative study would require the same weather situation to be repeated once with and once without spraying, which is practically impossible. In any case, the statistical data are a strong indication of the effect of the method, especially since the rains did actually begin after four years of sustained drought. Perhaps the strongest argument for the effectiveness of the spraying method, however, remains a striking pattern:

Everywhere Hangartner used his method
– in some of the driest regions of the world – the rain fell![4, 5]

While only **approximately 42 m³** of water was used to operate the unit for 14 days, 773.2 mm of precipitation fell in the Saurashtra and Kutch area in the second half of 1988. Subtracting the average annual precipitation of 202.5 mm over the preceding 3.5 years leaves 570.7 mm of additional precipitation. Over an area of approximately 109,000 km², this corresponds to a volume of approximately **62.2 billion m³** of water.[23]

4. Appeal to Policymakers, Science, Business, and Associations – Proposal for a Pilot Project

In view of the climatic developments described at the outset, I would like to submit the method to you for review. The starting point of this submission is the observation that periods of drought and heat in the USA are increasing in frequency and duration, and the resulting question of whether precipitation could be deliberately promoted using a comparatively simple, technically manageable method.

The proposal is that the U.S. federal government – possibly together with the states, business, the scientific community, and associations – initiate a pilot project with scientific supervision. The focus should not be on years of preliminary theoretical investigation, but on the practical question of whether precipitation can actually be triggered or at least promoted under real-world conditions.

A scientifically supervised pilot trial under real-world conditions would be the logical next step in testing the potential of the Rain-Maker method in the USA in practice. Particularly during a pronounced period of drought and heat, the meteorological conditions, the progress of spraying operations, and possible changes in humidity, air currents, cloud formation, and precipitation could be comprehensively recorded and documented.

Scientific supervision should support and evaluate the practical trial – but should not unnecessarily delay it through lengthy preliminary studies, fundamental theoretical debates, or excessive administrative hurdles. With a relatively simple and technically manageable method, it should be possible to promptly clarify the necessary safety and operating conditions and then conduct a well-documented field trial. Ultimately, many of the decisive questions can in any case only be answered under real-world conditions. The goal should therefore be: prepare carefully, provide scientific supervision – but above all, try it out.

According to the proposal, a possible mobile test unit for such a pilot project could consist of the following components:

- a trailer with a spray-nozzle unit and a pre-mounted water pump, compressor, and possibly a fan
- a second trailer with a power generator to power the pump system and fan
- the necessary water lines, spray nozzles, and any measuring and control equipment for scientific supervision of the trial

Such a system would cost approximately $190,000 to $270,000, and at full deployment, 5 to 7 systems would presumably be sufficient to deliberately trigger rain in most dry areas of the USA. As mentioned in the documentation, this method could not only combat rainfall scarcity but also lower steadily rising local temperatures. Considering that approximately $280 billion per year is invested in climate-friendly technologies in the USA,[37] such an experimental system would be a vanishingly small expenditure. I am convinced, however, that its impact would be great.

Let us have the courage to set aside any prejudices, entrenched patterns of thought, and premature doubts, and to approach new solutions with an open mind. Particularly in view of the growing challenges posed by drought, heat, water scarcity, and global warming, we should be open to different technologies and solutions. The Rain-Maker method shows that great things may already be achievable with a comparatively simple, low-cost, and environmentally friendly technology. The decisive factor should therefore not be whether an idea appears unusual at first glance, but whether it works under real-world conditions and delivers a concrete benefit. Having the courage to examine this without prejudice and test it in practice could prove far more significant than we may yet imagine today.

5. Different Design Variants of the Spray-Nozzle Unit

Different mobile designs are possible for the practical implementation of the method. Three basic technical variants are the main focus: a spray unit with a high-pressure pump, a spray unit with a water pump and combined compressed-air injection, and a design with an additional vertical fan based on a basic principle similar to that of a snow gun. The following designs show possible construction variants for a future prototype.

Variant 1 – Spray-Nozzle Unit with High-Pressure Pump

Water is drawn from a lake, river, or sea, filtered, and delivered to the manifold and spray pipes by a powerful high-pressure pump. The required spray pressure is generated entirely by the water pump; the nozzles atomize the water into fine droplets. This design can additionally be combined with one or more upward-facing fans.

Advantages:	simple design; high water throughput; fewer components; lower maintenance requirements.
Disadvantages:	very fine atomization requires correspondingly high water pressure; droplet size depends strongly on the nozzle and pressure.[13]

Variant 2 – Spray-Nozzle Unit with Pump and Compressed-Air Injection (Compressor)

The water pump delivers the water to two-fluid nozzles or pneumatic atomizing nozzles; the compressor supplies the compressed air separately. The air and water meet only in the nozzle or immediately outside it. The fast air stream breaks the water stream into considerably smaller droplets. For certain two-fluid nozzles, for example, water pressures of approximately 1–10 bar and air pressures of approximately 1–15 bar are sufficient. Depending on the system, droplets down to a few micrometers are possible. This variant can also be combined with an additional fan.

Advantages:	very fine and easily adjustable atomization; lower required water pressure; droplet size can be influenced through water and air pressure.
Disadvantages:	compressor and separate air line system required; higher energy demand; more technically complex.[14, 15]

Variant 3 – Spray-Nozzle Unit with Pump, Compressed-Air Injection (Compressor), and Vertical Fan

This design combines pneumatic atomization with an upward-directed airflow and is technically based on the principle of a snow gun. Unlike in snowmaking, however, the water is not intended to freeze, but to be dispersed as finely as possible in warm air and evaporated. One or more vertical fans transport the droplets upward, continuously supply ambient air, and extend the residence time of the water mist in the air.

Advantages:	very fine atomization; intensive mixing with ambient air; longer suspension and evaporation time; targeted upward transport.
Disadvantages:	highest technical complexity and energy requirements; additional weight; fan, compressor, and pump capacities must be coordinated.[16]

Possible Design Configurations

The following examples show different arrangements of the spray-nozzle unit and possible combinations of the three basic technical variants.

Note on the illustrations: The spray-nozzle units shown are concept visualizations, not photographs of existing systems. The illustrations were created as AI-assisted design visualizations according to the author's specifications. [17]



Ring-Nozzle Spray Unit with Vertical Fan
Operation: With pump, compressor, and vertical fan.
Transport: The mast can be tilted; the ring-nozzle unit and fan are removable for transport.



Circular Arrangement of a Spray-Nozzle Unit
Operation: With pump, compressor, and vertical fan.
Transport: The upper part of the spray pipes and the fan are removable.



Double-Row Spray-Nozzle Unit
Operation: With a high-pressure pump or with a pump and compressor.
Transport: The upper part of the spray pipes is removable.



Ring-Nozzle Spray Unit
Operation: With a high-pressure pump or with a pump and compressor.
Transport: The mast can be tilted; the upper part of the ring-nozzle unit is removable.



Single-Row Spray-Nozzle Unit
Operation: With a high-pressure pump or with a pump and compressor.
Transport: The upper part of the spray pipes is removable.



Bundled Spray-Nozzle Unit
Operation: With a high-pressure pump or with a pump and compressor.
Transport: The upper part of the spray pipes is removable.

6. Conclusion and Outlook

The “Rain-Maker” method combines a comparatively simple technical and physical concept with an extraordinary potential benefit. The experience and field trials to date show that, in my view, there are sufficient reasons to take up this method again and test it in practice under today’s climatic conditions.

Particularly in view of the increasing scarcity of rainfall, longer periods of drought and heat, and the associated consequences for agriculture, forests, rivers, water supply, the economy, and the population, the question arises whether we can afford to leave such an opportunity unused. Added to this is the immediately noticeable cooling effect of sustained rain: After prolonged periods of heat, the ambient temperature drops significantly within a short time, and the previously intensely heated ground is also cooled for a sustained period. If the Rain-Maker method actually makes it possible to deliberately trigger or promote precipitation, it could potentially not only combat drought but also counteract increasing global warming through this cooling effect.

We should therefore not dwell too long on the theoretical question of whether the method is possible or not. The decisive step would be to start the experiment under today’s conditions with scientific supervision and observe what actually happens.

What if the Rain-Maker method were successful – as I am convinced it would be – and one day we could use it to deliberately influence or “control” precipitation not only in the USA but perhaps throughout North America, so that rainfall scarcity and prolonged dry periods would increasingly become a thing of the past?

Its use in developing countries, whose opportunities for life and development are severely limited precisely because of a lack of precipitation and chronic water scarcity, could be no less significant. A comparatively simple technology that could reliably make rain possible there would be of an importance that can hardly be overstated for agriculture, water supply, and food security.

This documentation is intended to make an objective contribution to this effort and serve as a basis for more in-depth examination by interested parties in politics, science, business, associations, and public administration.

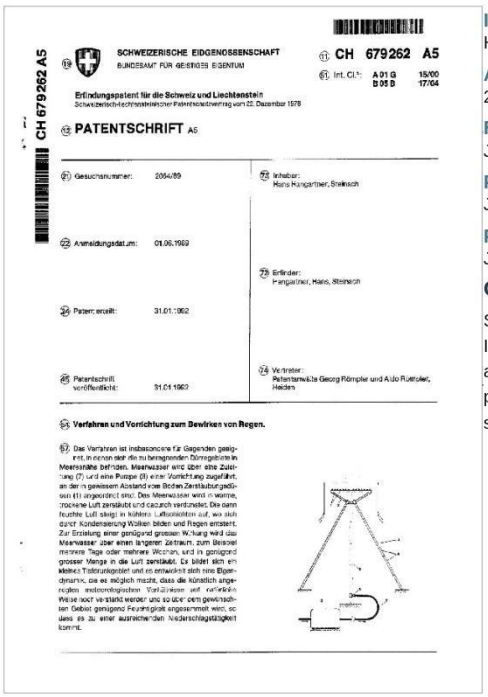
For ultimately, only a practical trial can show what is actually possible.

“We do not discover what is possible through doubt alone,
but by having the courage to try.”[22]

7. The “Rain-Making” Method – Basic Principle

Hans Hangartner and Patent CH 679 262 A5

“Method and Device for Producing Rain”



SCHWEIZERISCHE EIDGENOSSENSCHAFT
BUNDESAMT FÜR GEISTIGES EIGENTUM

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(73) Inhaber: Hans Hangartner, Steinach

(72) Erfinder: Hangartner, Hans, Steinach

(74) Vertreter: Patentanwälte Georg Römpler und Aldo Ruffoler, Heiden

(54) Verfahren und Vorrichtung zum Bewirken von Regen.

(57) Das Verfahren ist insbesondere für Gegenden geeignet, in denen sehr die zu bewegenden Dürregebiete in Meeresnähe befinden. Meerwasser wird über eine Zuleitung (7) und eine Pumpe (8) einer Vorrichtung zugeführt, an der in gewissem Abstand vom Boden Zerstäubungsdüsen (6) angeordnet sind. Das Meerwasser wird in warme, trockene Luft zerstäubt und dadurch verdunstet. Die dann feuchte Luft steigt in kühlere Luftschichten auf, wo sich durch Kondensierung Wolken bilden und Regen entsteht. Zur Erzielung einer genügend grossen Wirkung wird das Meerwasser über einen längeren Zeitraum, zum Beispiel mehrere Tage oder mehrere Wochen, und in genügend grosser Menge in die Luft zerstäubt. Es bildet sich ein kleines Tiefdruckgebiet und es entwickelt sich eine Eigendynamik, die es möglich macht, dass die künstlich angeregten meteorologischen Vorgänge auf natürliche Weise noch verstärkt werden und so über dem gewünschten Gebiet genügend Feuchtigkeit angesammelt wird, so dass es zu einer ausreichenden Niederschlagstätigkeit kommt.

Inventor / Owner
Hans Hangartner, Steinach

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Core Statement of the Patent

Seawater is to be finely atomized near ground level in coastal areas. In warm, dry air, it is intended to evaporate rapidly. The more humid air is intended to reach higher, cooler air layers, where clouds and precipitation can form. The operation is intended to continue for several days or weeks.

Excerpt from the supplied patent specification CH 679 262 A5.

The method is based on a remarkably simple physical consideration: If water – ideally water from a stream, river, lake, or sea – is pumped through a pipe system to a height of approximately five to nine meters and atomized there into the finest droplets, the total surface area of the water increases enormously. This allows a large volume of water to evaporate within a short time. Evaporation draws heat from the surrounding air and at the same time enriches it with additional moisture. It is precisely this change in the near-surface air layer that is intended to create favorable conditions for air movement, thermals, cloud formation, and ultimately rain.[3, 4]

The intensely heated near-surface air is moistened and locally cooled by the spraying process. In combination with the continued heating of the ground and the resulting differences in temperature and density, a local updraft can develop. If this process is continued without interruption over a longer period of time – several days to weeks according to the available documents – a small but persistent low-pressure area at ground level, or increasing air circulation, is expected to develop from it.[3, 4]

According to the available descriptions, this local system develops a certain momentum of its own: More humid air from the surrounding area – particularly from an adjacent body of water – is drawn in. The rising air reaches cooler air layers, where water vapor can condense and clouds can form. According to the historical reports, the area of influence is expected to expand over several days until an exchange takes place between the hot air over the dry land and the more humid air over the sea or a lake.[3, 4]

The Particular Importance of Seawater or Saltwater

Seawater or saltwater is of particular interest for the Rain-Maker method for two reasons. First, like any sprayed water, it fulfills the thermal function of the method: The greatly increased surface area of the finest droplets promotes evaporation, cools the surrounding air, and at the same time increases its moisture content.

Second, seawater or saltwater introduces dissolved salts and minerals into the air in tiny droplets. When some of the water evaporates, very small salt-containing particles remain. These are hygroscopic, meaning they can absorb moisture from their surroundings. This adds a microphysical effect to the thermal effect of the spray water, which can be significant for the formation and growth of cloud droplets.[11]

Thus, the possible advantage of seawater or saltwater is not that saltwater evaporates to a greater extent or more quickly than pure water. Rather, it combines the introduction of water with the additional introduction of natural salt-containing aerosol and condensation nuclei. In this sense, seawater or saltwater can functionally supplement the described method compared with freshwater with very low mineral content and possibly make it more efficient.[11]

Condensation Nuclei and Cloud Droplets

For water vapor in the atmosphere to condense into cloud droplets, so-called condensation nuclei play an important role. These are very small particles in the air to which water molecules can attach. When water containing dissolved minerals is sprayed – particularly pronounced with seawater and to a lesser extent with lake or river water – extremely fine salt or mineral particles may remain after partial or complete evaporation.[11]

Such hygroscopic particles can absorb moisture and, under suitable conditions, act as natural cloud condensation nuclei. In a developing cloud, the resulting small droplets can continue to grow and combine with other droplets. However, for precipitation to ultimately form from cloud droplets, the necessary meteorological conditions must also be present.[11]

Raoult's Law

The 1989 report "Der Mann, der es in der Sahel-Zone regnen liess" ("The Man Who Made It Rain in the Sahel Zone") explicitly refers to Professor François-Marie Raoult in Grenoble and the law named after him in connection with Hangartner's rain activation. The report from that time links this law to the freezing-point depression and boiling-point elevation of solutions.[4, 9]

For the effect of salt-containing water considered here, the vapor pressure of a solution is of particular interest. In simplified terms, Raoult's law describes how water containing dissolved salts or other substances – for example, seawater or saltwater – has a somewhat lower vapor pressure than nearly pure or distilled water. Freshwater also generally contains dissolved minerals and salts, although usually in lower concentrations than seawater. This so-called Raoult effect is also significant for very small salt-containing droplets or aerosol particles.[9]

$$p(\text{water, solution}) = x(\text{water}) \times p^0(\text{water})$$

Köhler Theory – The Link to Cloud Formation

A further physical explanation is provided by Köhler theory in cloud microphysics. It describes the conditions under which small hygroscopic aerosol particles absorb water, continue to grow, and can be activated as cloud droplets. It combines the influence of dissolved substances, as described by the Raoult effect, with the influence of the curved surface of very small droplets.[10, 11]

This relationship is of particular interest for sea salt: Due to their hygroscopic properties, sea salt particles can absorb water and, under suitable humidity or supersaturation conditions, can be activated as cloud condensation nuclei. Hangartner's reference to seawater and Raoult's law thus receives an additional microphysical explanation.[10, 11]

Brief Summary
In the described method, freshwater acts primarily through atomization, evaporation, cooling, and moisture enrichment. Seawater or saltwater additionally combines this effect with the introduction of hygroscopic salt particles that can act as condensation nuclei. Seawater or saltwater can therefore have an additional functional advantage for the method.

Hangartner's Model of Action – the Two Sketches

The two sketches used by Hangartner illustrate the interplay he assumed between dry land, sea, and atmosphere. They were redrawn and clearly labeled for the documentation so that they could later be easily translated into other languages.[4]

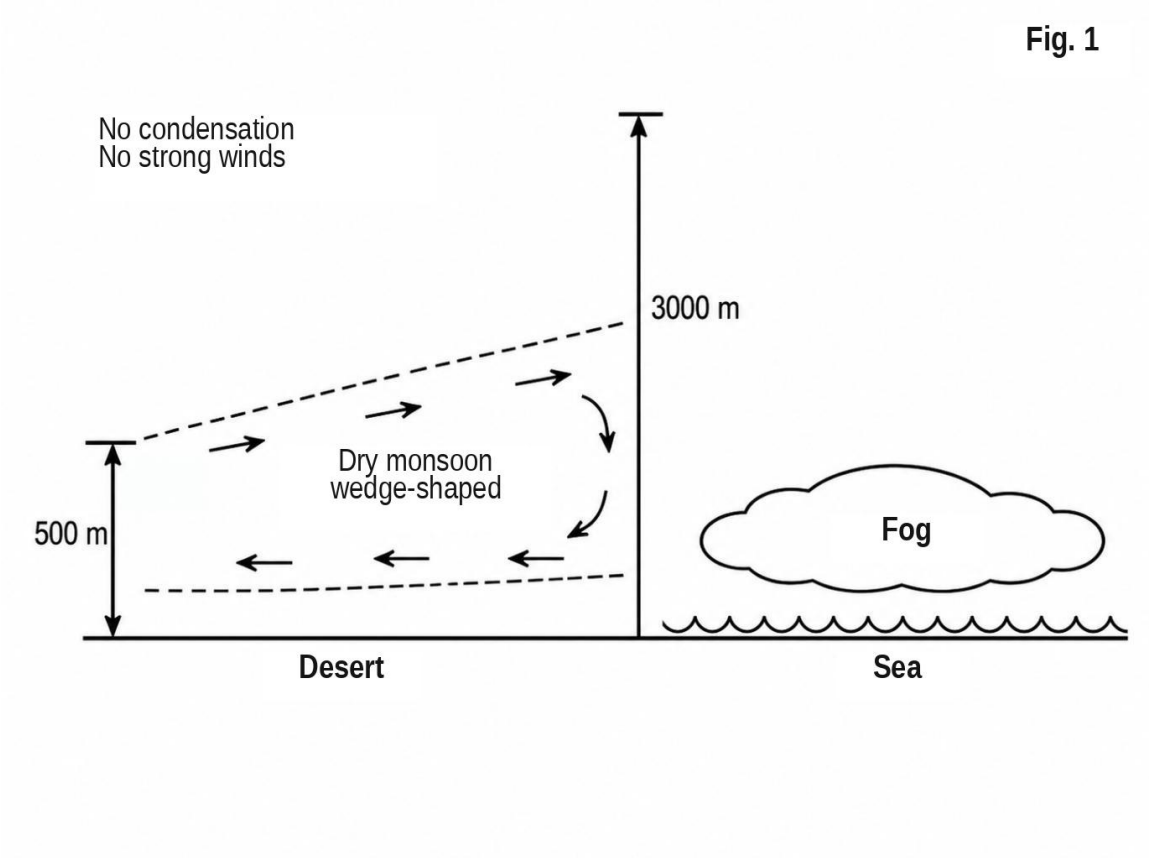


Fig. 1 (redrawn): Initial situation according to Hangartner – dry, wedge-shaped monsoon over the desert; a fog bank lies over the sea.

Fig. 1 shows the initial situation: According to Hangartner's depiction, a dry, wedge-shaped monsoon moves over the desert only at a comparatively low altitude. Over the sea, by contrast, there is a fog bank. The sketch labels this condition "No condensation" and "No strong winds." The exchange of moisture between sea and land is still weak in this depiction.[4]

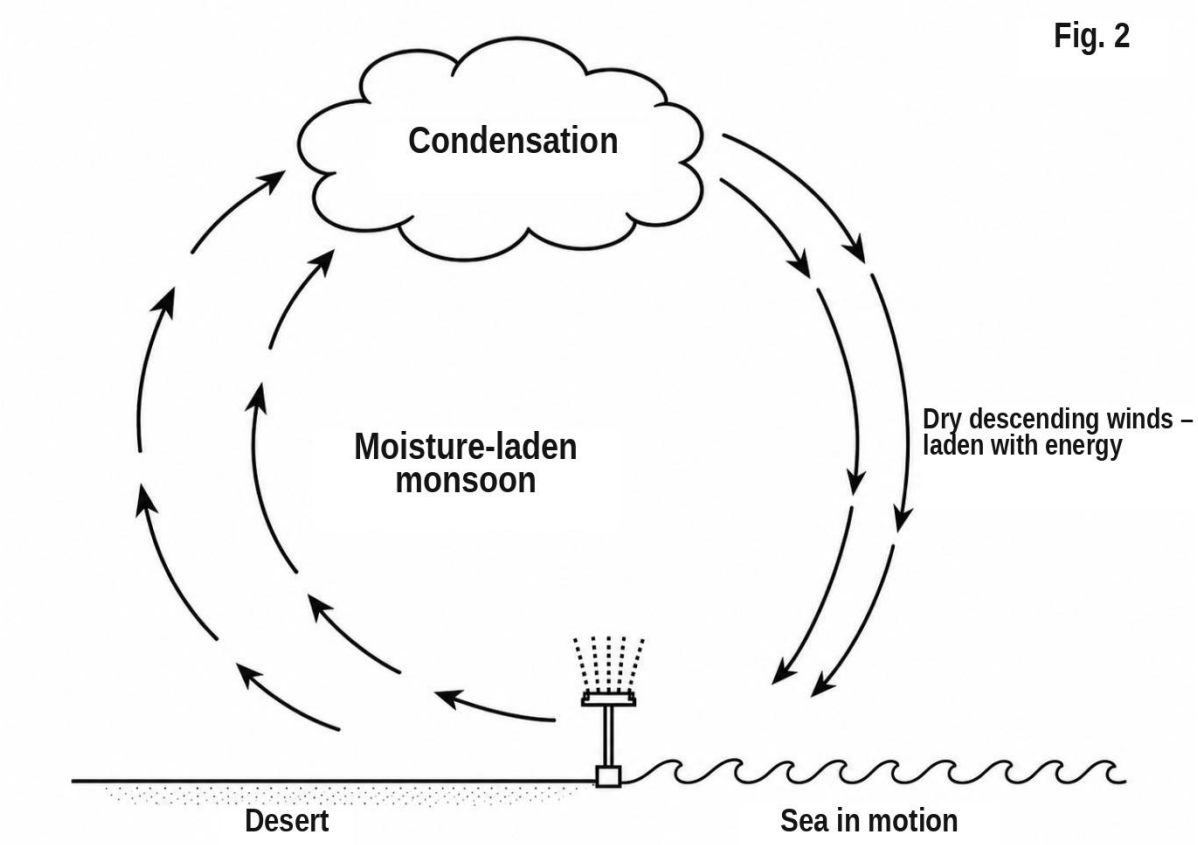


Fig. 2 (redrawn): Strengthened cycle – moisture-laden air rises, condensation begins, and dry descending winds – laden with energy – flow back toward the body of water.

Fig. 2 shows the cycle activated according to Hangartner's concept. Moisture-laden air flows from an adjacent body of water – sea, lake, or river – toward the warmer land and rises there. At higher altitudes, condensation begins, releasing heat. The subsequently drier air descends again and flows – labeled in Hangartner's sketch as "dry descending winds – laden with energy" – back toward the body of water. There it can absorb moisture again. Continued spraying is intended to stimulate and increasingly strengthen this cycle.[4]

Note: The two redrawn figures are based on the handwritten sketches in Hans-Joachim Ehlers's article, "Der Mann, der es in der Sahel-Zone regnen liess" ("The Man Who Made It Rain in the Sahel Zone"), raum&zeit 43/89, p. 70. The basic idea depicted was retained in the redrawing.[4]

Two Interconnected Levels of Action

The sketches primarily describe the large-scale dynamic level of the method: air movement, moisture transport, ascent, condensation, and return flow.

Raoult's law and Köhler theory complement this model at the microphysical level: They explain the relationship between dissolved salts, hygroscopic aerosol particles, and the formation or activation of cloud droplets.[9, 10, 11]

Taken together, this results in an expanded model of action: On the one hand, the spray system is intended to influence the near-surface air thermally and dynamically and support a larger circulation

between land and water; on the other hand, when seawater or saltwater is used, natural salt-containing condensation nuclei can additionally be introduced into the atmosphere.

According to the available sources, the described effect – from the start of spraying to the onset of precipitation – is reported to typically occur after about three to fourteen days, although this can vary considerably depending on local conditions.[4, 6]

The report from the Sahel region describes how a sufficiently large circulation had developed after approximately three days and rain began on the fourth day. During the 1988 deployment in India, it began to rain approximately two weeks after Hangartner's arrival, on July 14, 1988.[4, 6]

The drier the air and the more intense the solar radiation, the better the Rain-Maker method works.

8. Meteorological Background

The Low- and High-Pressure Relationship

The temperature and pressure gradient between the intensely heated land and an adjacent, cooler body of water is of particular importance for the method. Air rises over the warm land, while the air over the sea, lake, or river remains comparatively cooler and denser. This can create airflow of the kind familiar from natural land–sea breeze circulation.[12]

Importance of the Deployment Site

The choice of deployment site therefore plays a central role. Whenever possible, the spray unit should be operated directly beside a sea, lake, river, or another sufficiently large body of water. This not only provides sufficient water for the spraying operation but also ensures that a natural source of moisture is in the immediate vicinity.[4, 5, 12]

Meteorological Conditions

How strongly the process initiated by the spray system develops depends on the prevailing meteorological conditions. The following are particularly significant:

- Air temperature and humidity
- Intensity of solar radiation
- Wind direction and wind speed
- Temperature distribution in higher air layers
- Stability or instability of the atmosphere
- Size and temperature of the adjacent body of water
- Terrain and existing regional wind systems.[12]

The choice of deployment time and location is therefore decisive. According to the available descriptions, particularly hot, dry, and sunny conditions are favorable for the method.

Other Influences

It is conceivable that other local or meteorological factors influence the course of the process. A practical trial in particular could help to directly observe such relationships and gain insights into suitable locations, optimal deployment timing, and the effect under different weather conditions.

9. Sources and References

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Author’s Quote

[22] Jonathan Hertig: “We do not discover what is possible through doubt alone, but by having the courage to try.” Quote by the author, 2026.

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Calculation Details: Water Used to Trigger Rain and Amount of Rainfall:[23]

In the years:

- 1985 297.7 mm annual precipitation
- 1986 303.8 mm annual precipitation
- 1987 92.5 mm annual precipitation
- 1988 14.9 mm precipitation in the first half of 1988, January–June
  708.9 mm total precipitation / 3.5 years = **202.5 mm average precipitation** per year
  (In early July, Hangartner began the “rain experiment,” and on July 14, 1988, rain began to fall.)

  After the rain experiment of July 1–14, 1988, **773.2 mm of rain** fell by the end of 1988 (see documentation “The Rain-Maker”).

- During the 14 days, Hangartner used approx. 3 m³ of water per day = **total 42 m³ of water**
- Area of the Saurashtra + Kutch region in India = 109,000 km²
- Amount of precipitation: rain through the end of 1988: 773.2 mm, minus 202.5 mm, = **570.7 mm** average precipitation **× 109,000 km² =** total 62,206,300,000 m³ (**62.2 billion m³ of rainfall**)

  Precipitation data of the India Meteorological Department for Saurashtra and Kutch:
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