

## Salt Extraction in Israel

**I**SRAEL WILL SOON make public an invention designed to transform the oceans into limitless cheap reservoirs of water fit for human consumption and agriculture.

The Government is completing a pilot plant that utilizes a new process—freezing sea water and then melting it—that was invented in Leningrad and perfected in Tel Aviv by a refugee engineer from the Soviet Union.

It is based on the fact that ice formed by freezing sea water is free of minerals.

Actually, the process is older than the 63-year-old inventor, Alexander Zarchin. On the Siberian coast, the Russians have long been cutting blocks of ice from the frozen Sea of Japan and carting them to a reservoir on a mountain top. In the summer, the molten ice has been flowing down to the city of Vladivostok to supply the populace and the ships in the harbor with clear water.

Mr. Zarchin's invention is designed to achieve artificially on the semi-tropical shores of the Mediterranean what nature has

been doing on the frigid coast of the Sea of Japan. By conventional means, it requires thirty-five kilowatt-hours of energy to freeze one ton of water.

Mr. Zarchin says that the desalination of a ton of water by his method will require only three or three and a half kilowatt-hours of energy. However, even if it takes as many as six kilowatt-hours it will still be worthwhile for a country like Israel, which pays heavily for her water supply.

The inventor hit upon his idea in 1933 when he was assigned by the Red Army to study the problem of water supply for troops in the Turkmenistan area, where the water is brackish. He designed machines in which water was frozen by evaporation and then melted. His Israeli invention is a great improvement, for it provides for a continuous process of freezing and melting.

As explained by the inventor, it works in this manner:

**W**ATER is pumped from the sea and sprayed at almost no pressure into a vacuum tank. Be-

cause there is no air pressure in the tank to hold the water's molecules together, the water begins to evaporate. This causes the temperature to drop below the freezing point, and part of the water freezes as it drops.

Thus the sea water spraying into the tank is divided partly into vapor, which floats to the top, and into ice crystals and brine, which fall to the bottom.

The mixture of ice and brine is pumped from the tank to a conveyor belt. The brine, in which all the salt is concentrated, seeps through the belt and is drained back into the sea. The ice crystals are conveyed by the belt to another vessel.

Meanwhile, the vapor at the top of the tank is constantly siphoned out to maintain the state of vacuum. It is piped to the second vessel, where it meets the ice crystals again. The vapor restores the latent heat to the ice and causes it to melt.

Mr. Zarchin is unable to recall how he happened to think of the freezing method in the first place. He assumes that the thought grew out of widespread discussions about polar exploration in 1933, when the Red Army gave him the problem. Newspapers reported at that time that explorers would supply themselves with clear water by melting polar ice.

Mr. Zarchin had been a research assistant at the Leningrad

Technical Institute. He was assigned to examine an Austrian machine for the distillation of water by electro-osmosis and to report on the practicability of adopting it for desalting brackish water. He reported that the method was too expensive, and he recommended freezing.

**A**FTER A YEAR'S work he developed a machine, which was mounted on a truck and put into operation as a mobile desalinator. The Soviet Government awarded a prize to the inventor. Shortly afterward, he was arrested for "Zionism," which is a criminal offense in the Soviet Union. He was sentenced to the asphalt mines west of the Ural Mountains for five years.

In prison, he invented a method for the extraction of lacquer from bitumin.

After his release in 1939, he lived in Moscow illegally because the terms of his release barred him from forty-eight cities. When the Soviet Union entered the war against Germany in 1941, he served in a labor battalion near Leningrad.

He became ill and was evacuated to Tashkent. There he bought the passport of a dead Polish refugee. With that document he left the Soviet Union after World War II and reached the displaced-persons camps in Germany. He arrived in Israel in 1947.

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