

PHYSICS

Artillery Size Atomic Bomb

Dress rehearsal for use of atomic weapons by and against ground troops to be held near Las Vegas. Conventional artillery can heft sufficient weight for A-bombs.

► **ATOMIC WEAPONS** for use by and against ground troops are to get a rehearsal in Operation Desert Rock on Frenchman's Flat Proving Grounds near Las Vegas, Nev. There is little doubt therefore that the atomic bomb has been made sufficiently small to be handled by artillery or some sort of guided missile.

Actually the explosive part of the atomic bomb need not be very heavy or very large. That was made known by the famous Smyth report of 1945 which stated the limits of the critical mass of the fissionable material that makes the big bang.

"The mass of the U-235 required to produce explosive fission under appropriate conditions can hardly be less than 2 kilograms nor greater than 100 kilograms," the report stated. Translated into pounds that means somewhere between 4.4 pounds and 220 pounds. But a British publication of undoubted authority somewhat later narrowed the limits to somewhere between 22 and 66 pounds.

An atomic bomb of the now usual fissionable material plutonium could therefore be made of two chunks of plutonium, each about 50 pounds or so, that can be brought together with suddenness and therefore caused to explode by action of excess neutrons of their atoms producing an almost instantaneous chain reaction.

While the early atomic bombs undoubtedly needed much more weight of apparatus to set them off surely and safely than the weight of fissionable material in them, there has been time to make such exploding apparatus much lighter and smaller.

Even relatively conventional artillery can heft quite a weight. The 155 mm. howitzer has a shell weight of 95 pounds and the 240 mm. howitzer throws a shell of 345 pounds. The gigantic railroad 14-inch rifle shell weighs 1200 pounds, which is certainly plenty for a very sizable atomic charge. Then there was the mortar of 36-inch diameter, called "Little David", which is known to have been built.

Guided missiles such as giant rockets would carry even heavier loads, but details about them are cloaked in secrecy of recent military developments. They may not be as accurate as artillery, but with an atomic weapon it probably is not necessary to be as accurate as with a lesser explosive.

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CHEMISTRY

Nitrogen Droppeth as the Gentle Rain from Heaven

► **NITROGEN**—vital to the fertility of the soil—comes sifting down from the atmosphere onto the ground at the rate of 5.8 pounds per acre per year.

This is called a "significant" amount by DeLoss H. Matheson, chemist and bacteriologist of Hamilton Filtration Plant at Hamilton, Ont. He reported in the *CANADIAN JOURNAL OF TECHNOLOGY* (Sept.) on the results of 18 months of study of the fall of inorganic nitrogen compounds on the earth and bodies of water near Hamilton.

It was found, reported Mr. Matheson, that rain and snowfall produced more nitrogen than dry days, but that there were many variations on days when there was no moisture. Explanations of these variations, he said, would have to be found in more complex changes in atmospheric conditions than could be determined by the observations made in this study.

Generally, it was found, short, sharp rains yielded more concentrated solutions than did longer precipitations.

Mr. Matheson found that, during the period covered by his investigation, the total nitrogen fall was consistent with amounts previously reported by other investigators.

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INVENTION

Patent Device to Make Any Hospital Bed a Rocker

► **ANY HOSPITAL** bed becomes an oscillating type somewhat similar to the rocking bed now used in polio treatment with special attachments which are used on one bed as long as needed, then moved to another. It is designed to give oscillation therapy, a type of treatment employed for several physical difficulties, without moving the patient from the bed.

The equipment is in two parts. One is a fulcrum to place under the bed near the head end and raise the bed from the floor. The other is an electrically-operated device placed at the foot of the bed which raises and lowers the foot of the bed in rhythm. By adjustment of the fulcrum, the oscillating movement of the head can be greater or smaller. Patent 2,566,239 was awarded to Nathan D. Mininberg of New York for this invention.

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FISH JET STREAM—The jet of water which this Archer fish at the Steinhart Aquarium of the California Academy of Sciences shoots out will hit insects on overhanging vegetation at distances of several feet. From Southeast Asia, the fish spout with great accuracy and high velocity. The duration of the jet stream is less than one twenty-fourth of a second, timed exposures on motion picture films have shown.