

ENGINEERING

Dams Protect and Destroy

Dams, an ancient and still important means of harnessing rivers for man's use and protection, can also be a devastating force causing death and destruction.

► **MAN'S ATTEMPT** to harness mighty rivers sometimes backfires with deaths and severe injuries, crushed towns, uprooted trees and muddy devastated fields.

Catastrophes such as the floods of Montana result when sudden natural forces of unusual rainfalls, melting snow, avalanches or earthquakes break open a dam and thousands of tons of water crash upon cities and towns as the water seeks its own level and beats a path to the sea.

Record rains and melting snows were the basic causes of failures on three Montana dams at Swift reservoir on Birch Creek, Choteau reservoir on Sun River and another reservoir at East Glacier, engineers and geologists believe. The earth dam on the reservoir of Baldwin Hill, Calif., developed a crack last December because of earth movements.

The tragedy of the Vaiont Dam in Italy last October was caused by a landslide that spilled thousands of tons of water over the lip of the arch dam to devastate villages below. The Vaiont Dam itself did not fail, geologists point out.

Man has been building many kinds of dams for many purposes throughout the centuries. Basically a restraining barrier built across a stream or river, a dam holds

back the flow of water, causing a lake to form in the area just behind the dam.

This lake can be used as a reservoir for drinking water, for irrigation of the surrounding countryside, or for recreation with fishing, boating, swimming and other sports. The pent-up energy of the water can be put to work turning a wheel to grind wheat or corn, or nowadays turning huge turbines to provide electric power and light throughout the area.

One of a dam's most important functions is to catch rain and flood waters in times of heavy flow and protect towns and cities farther down the river from being inundated. In times of drought or dryness, the sluices or gates can be opened and the precious water sent where needed.

Yet dams have created problems also, and have created bitter enemies who believe that their harmful potential far outweighs the good benefits. Dams are always in danger of breaking, they point out, either by natural forces or by man-made bombs.

Another big headache is the slow gathering of material behind the dams, as the streams and rivers deposit behind the barricade soil, pebbles and even rocks that cannot be removed and fill up certain dams.

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TECHNOLOGY

More Electric Power

► **GENERATING MORE ELECTRICITY** from the same amount of fuel is the aim of every power station engineer. Now a British company, International Research and Development, claims to have achieved this goal with MHD, or magnetohydrodynamic, generation.

This means producing electric power by forcing a hot gas, or plasma, through a strong magnetic field. Although the principle is simple, the practical problems are immense.

Dr. H. M. Finniston, managing director of the company, has said that MHD could be a practical proposition as early as 1975. He foresaw that it would be possible to get 50% more electricity from the same amount of fuel.

The experimental generator at Newcastle-on-Tyne, England, uses an electric heater to imitate the reactor. Helium gas, "seeded" with a little cesium metal to make it a better electrical conductor, flows through the heater and generator in a closed cycle.

The generator, which is claimed to be the first to produce a significant amount of electricity continuously for a long time, works at about 3,300 degrees Fahrenheit. This will have to be decreased to 2,700 de-

grees Fahrenheit or less before MHD can be used commercially.

So far, the research has cost about \$850,000, contributed by C. A. Parsons & Company, the parent company of International Research, and the Advanced Research Projects Agency of the U. S. Department of Defense. This means that the patents so far achieved are shared equally between the British company and the U.S.

The U.S. grant ended last November, but it is estimated that a further \$700,000 will be needed in the next two years to maintain progress. Despite the promise of the project, difficulties have been met in raising the funds.

Financial help has been sought from the Ministry of Power, which in turn consulted the Central Electricity Generating Board and the Atomic Energy Authority, two almost autonomous empires.

In addition, the company must make an official application to the Department of Scientific and Industrial Research for the needed grant. The DSIR, however, comes under the Ministry of Science which does not have power to over-rule the Ministry of Power.

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World Knowledge Pool Investigates Dams

► **A WORLD KNOWLEDGE POOL** to investigate the mysteries of rock and other foundations which cause large dams to fail is being organized as the result of the International Congress on Large Dams held in Edinburgh, Scotland.

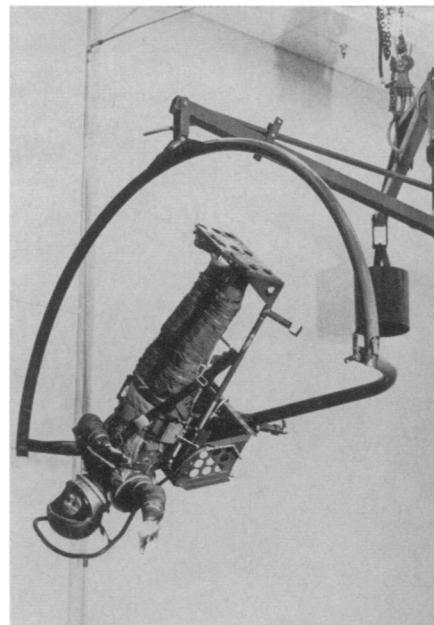
Mysteries of the underpinnings of great engineering works could be explained if all dam engineers contributed every scrap of information within their experience, J. Guthrie Brown, British consulting engineer and newly elected president, declared.

Dr. Claudio Marcello, Italian engineer who investigated the disastrous Vaiont rock slide of October 1963, emphasized the need for engineers to focus on natural factors over which they have little power. The practical impossibility of attaining a complete knowledge of conditions and unpredictability of nature is the most serious obstacle to absolute dam safety, he said.

U.S. engineers emphasized that the dam designer owes a duty not only to those whom the dam will benefit, but also to those who live in the valley below.

In the last 50 years, the size of thousands of dams built all over the world has risen sharply, while the rate of failure has declined rapidly.

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Lockheed

SWINGING IN SPACE—Propelled by airjets on his gloves, George Hanff, human factors specialist, maneuvers as if in space. The zero gravity simulator at Lockheed-California Company's Rye Canyon Research Center is so delicately balanced that most effects of space weightlessness can be accurately simulated and movement from point to point in any direction is possible.