

# Rockets to Go to Unknown Heights

*Astronautics*

## Prof. Goddard Resumes Experiments At Camp Devens

FROM a small depression in a remote corner of Camp Devens, near Worcester, Mass., where thousands of American soldiers trained during the war, there will soon echo sounds of explosions reminiscent of war-time artillery practice. But the sounds will not be of big guns. They will be from rockets sailing upwards from a steel tower to heights that cannot be predicted with certainty. Perhaps their greatest altitude for some time to come will be measured in only thousands, or even hundreds, of feet, but from them scientists are looking forward to the time when they will be able to explore heights above the earth far greater than any reached by airplanes or balloons. Perhaps eventually travel to the moon or even to other planets will become possible by a development of such rocket experiments.

The Camp Devens experiment is part of the work of Dr. Robert H. Goddard, professor of physics at Clark University. Dr. Goddard is one of the pioneer students of this form of locomotion. It was in 1912, while at Princeton University, that he began his researches. In 1914 he went to Clark, where he has worked ever since. Much of his work has been

done with the assistance of the Smithsonian Institution and later of the Carnegie Institution of Washington. In 1919 the Smithsonian Institution published his first report on his work in which he outlined his theories and experiments.

Referring to this report, Dr. C. G. Abbot, secretary of the Smithsonian Institution, said recently: "Professor Goddard's basic inventions of 1914, whereby he applied the correct angle gas orifice; his later successful introduction of continuously burning liquid propellants; and his mathematical theory, published by the Institution in 1919, form the foundation on which important events in the exploration of the air will probably depend."

So important have been Dr. Goddard's researches, and so much do they promise, that now a grant has been made to him by Daniel Guggenheim in order that he may continue them with adequate facilities.

The Goddard rocket is essentially the same as the Fourth of July pyrotechnic, in that it is propelled by the recoil from the discharge of gases. This is quite different from the way an airplane is propelled, for example, which depends upon an actual push against the atmosphere. As a result,

the rocket will work just as well outside the earth's atmosphere as in it; in fact, since the air causes a certain amount of resistance, it would theoretically work better in a vacuum. Professor Goddard has perfected a liquid propellant for his rocket which has many advantages over gunpowder or similar explosives. As this burns up as it is used, the rocket continually becomes lighter. In scientific exploration of the upper atmosphere, above the present altitude records, instruments would be carried up, and a parachute would bring them safely to earth after the charge had been exhausted.

Dr. Goddard does not promise when he will be able to send rockets up to these great altitudes. The only ones he has fired so far are small affairs, which have only ascended a few hundred feet. Similar rockets will be fired from the Camp Devens station, though increasingly higher and higher altitudes should be attained. He compares his present experiments with the first efforts of the Wright brothers, who flew only a few feet, but whose work laid the foundation for the present high development of the airplane.

After the rocket is perfected, scientists expect that many present-day puzzles will be solved. It will be possible to study the spectrum of the sun without the screening effect of the ozone layer 50 to 75 miles above the earth, which cuts out a large part of the solar radiation. Knowledge will doubtless be gained of the Kennelly-Heaviside layer, the ionized stratum in the atmosphere that makes possible long distance radio. Samples of the atmosphere from these high altitudes may be brought down for analysis, and it may prove that at these heights what rarefied atmosphere there is consists mainly of hydrogen and helium instead of oxygen and nitrogen. And then, in the far distant future, perhaps, the scientists foresee the time when they can actually send a rocket to the moon, 240,000 miles away, or even to one of the other planets, millions of miles distant. But there are more immediate practical considerations that justify the expenditure of time and money on the experiments.

## Pyramid Peels Like An Onion

*Archæology*

THE Aztec pyramid at Tenayuca, that "peels like an onion," has revealed a new surprise in its innermost layer. Like a nest of boxes, three pyramids have been located, each built over the last, and now the original, inner structure turns out to be two.

Mexican archæologists discovered the third layer when they attempted to run an exploratory tunnel through the heart of the layered pyramid. When a third nucleus was struck, they diverted the tunnel around this original building to locate its entire plan. This has revealed the apparently twin nature of the pyramid's heart. The oldest building proves to be straight-walled like modern structures, not sloping of wall like typical Aztec pyramids.

It is believed that the original structure was enlarged by a side addi-

tion. If this is correct, it means that five stages of human habitation may be counted at Tenayuca. The second pyramid also represents two stages, since it shows signs of having been remodeled and redecorated at some time after it was originally built and used.

Several idols have been found in the earth-and-rock fill which was piled on the inner structure in building pyramid two. These are pronounced not Aztec in style, and much more primitively made. One, about a foot high, is believed to represent a warrior figure in tunic and rudimentary headdress of plumes. His cast of feature suggests the art of the Totomac, a race which inhabited the Gulf state of Vera Cruz and which had some affiliation with the Mayas of southeast Mexico.

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