A S T R O N A U T I C S

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THREE NEW ROCKETS BEING BUILT

Three new rockets, each of different type, are now in course of construction under the auspices of the Experimental Committee of the Society, it was announced by Mr. Laurence Manning, president of the Society, at the first meeting of the season held Friday night, September 22. The expectation is that these rockets will be ready for tests late this fall, and arrangements are being made to test them at the New Marine Park, Great Kills, Staten Island, where last spring the Society successfully shot Experimental Rocket No. 2.

Details of the three new rockets, designated as Experimental Rockets No. 3, 4 and 5, will be found in the following pages.

(continued on page 8)

A CONCENTRIC TANK ROCKET

Experimental Rocket No. 3, designed by Bernard Smith and G. Edward Pendray, will be five feet six inches tall and eight inches in diameter at the largest part. It will have a maximum fuel capacity of one quart of gasoline and four quarts of liquid oxygen; will weigh, loaded, about twenty pounds, and will have a lift of approximately sixty pounds, giving an acceleration of 2 gravity, or 64 feet per second per second.

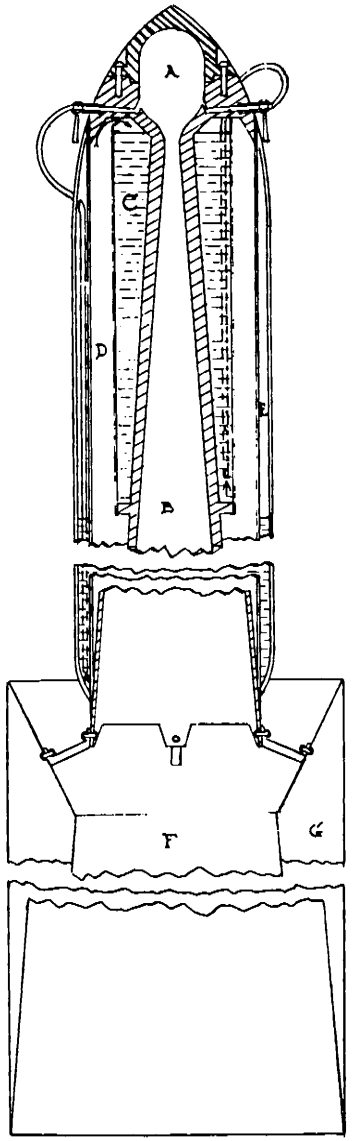
Fully loaded, the firing time will be nearly one minute, and the theoretical altitude obtainable in a vacuum would be forty miles. In actual firing tests, however, only half the maximum amount of fuel will be used. Air resistance will greatly reduce the altitude obtainable. The designers hope for a height of three to five miles, and a safe descent by parachute.

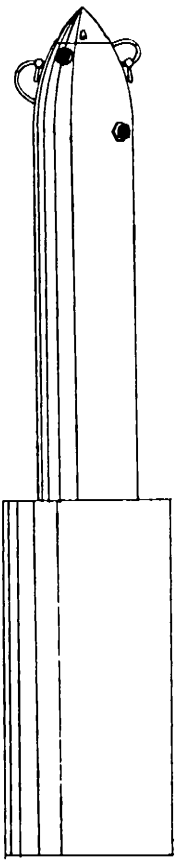
The rocket consists of two parts. The upper portion contains the motor (similar in design to the successful motor of Experimental Rocket No. 3, fired last spring) and a long nozzle, surrounded by concentric tubular tanks. The gasoline will be confined in a small tank C near the throat of the nozzle, and will be forced into the combustion chamber by nitrogen under pressure in tank D. The liquid oxygen will be contained in the outer tank E, where it will be fully protected from the flame of the exhaust.

The lower part of the rocket will be a light aluminum cylinder, the inner portion F of which will have the shape of a venturi tube. In the space G between the venturi and the outer, cylindrical shell will be housed the instruments, parachute and parachute ejecting device. The venturi tube is expected to give the rocket stability in powered flight and to increase the lift obtained from the fuel at slow speeds.

An overall view of the rocket is shown at H.

A--combustion chamber
B--expansion nozzle
C--gasoline tank
D--nitrogen pressure tank
E--oxygen tank
F--venturi tube
G--parachute and instrument compartment
H--overall view





Detail of Rocket No. 3

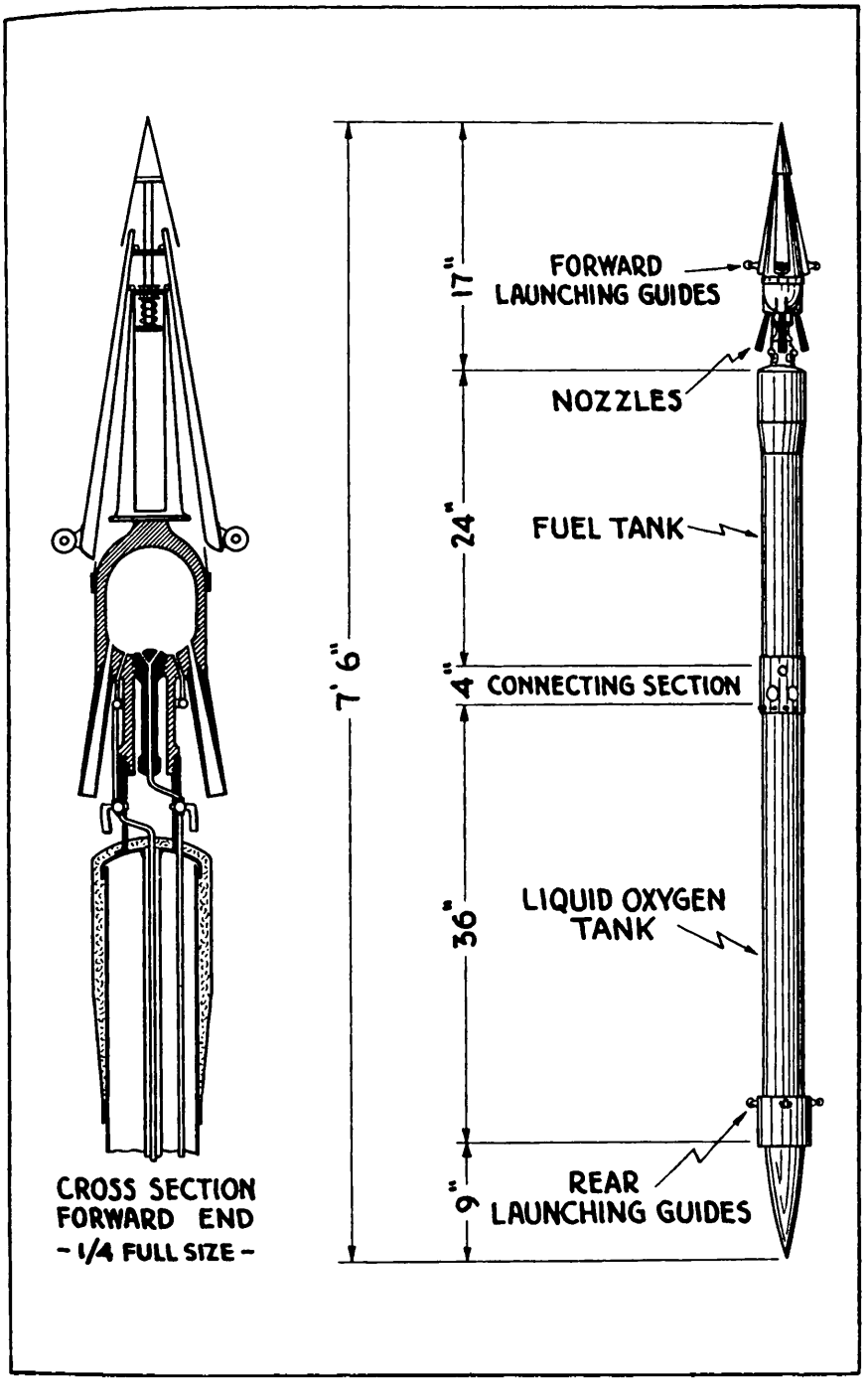
WING LANDING GEAR - FOUR NOZZLES

Carl Ahrens, Laurence Manning, Alfred Best and John Shesta designed and are constructing Experimental Rocket No. 4. It will be seven feet six inches in length and a trifle more than three inches in largest diameter. It will carry one pint of gasoline and one quart of liquid oxygen, will fire twenty seconds, and should have an accelleration of about 2 gravity. The designers expect to obtain an altitude of three to five miles.

The rocket is designed for three chief points: (1) Extremely narrow cross-section designed to reduce air resistance to an absolute minimum. (2) Complete mixing of the fuels in as short a time as possible. There are four oxygen inlets and two gasoline inlets to the combustion chamber. The four-fold exhaust is required by the design and not otherwise important. (3) A device to lower the rocket gently to the ground after flight. This consists of four propeller blades which are held down in flight by air resistance but which open out when the rocket starts to fall backward and thereafter spin about on their axle and allow the whole machine to descend like an autogyro.

The rocket is designed to prevent its descent head first. The ring at the tail upon which are placed the rear launching guides provides sufficient drag to prevent the nose-heavy rocket from making an arc at the top of its flight--at least when the angle of flight is vertical or close to the vertical. The actual sizes of the various parts will not be decided until the model is almost complete and an accurate measurement of air pressures and areas can be made.

The mechanics should be apparent from the drawing by Mr. Ahrens. The oxygen is fed through a pipe-enclosed feed-tube which runs through the gasoline tank above and so to the motor. Methods of firing are similar to the Society's first rocket--indeed the motor casting is exactly the same as in Experimental Rockets 1 and 2, using the lugs for exhaust and the exhaust being plugged and drilled for the gasoline feed.



Detail of Rocket No. 4

A NEW TYPE OF MOTOR AND FUEL TANK

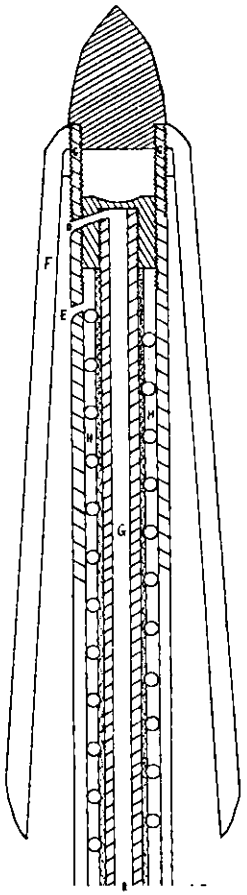
Experimental Rocket No. 5, designed by H. Franklin Pierce, Nathan Carver and Nathan Schachner, contains two radical new points of design. The motor consists of a cone F instead of the conventional chamber and nozzle. The fuel is introduced through two rings of outlets D and E near the upper part of the cone. Combustion takes place in the cone, which serves both as combustion chamber and nozzle.

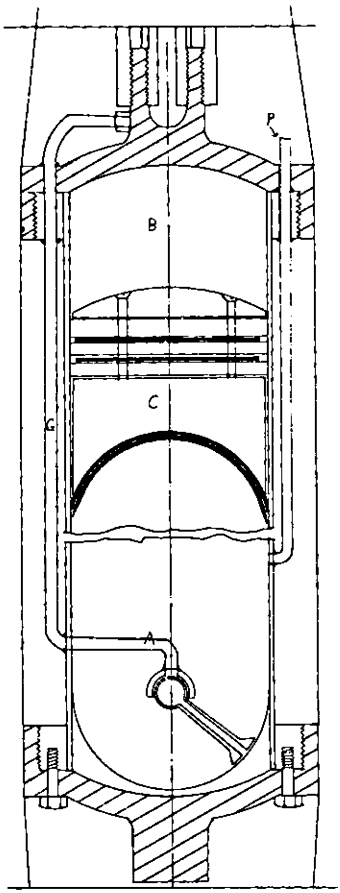
The second departure from conventional design is in the fuel tank arrangement. Here the fuels are not kept in separate tanks, but in the same cylindrical tank, separated by a movable plunger or piston C. With this device, the designers believe no nitrogen pressure will be needed, since the pressure of evaporated oxygen, acting equally on the piston above and the liquid oxygen below, will force both oxygen and gasoline into the combustion cone at equalized rates.

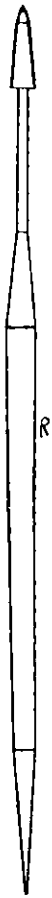
Neither of these departures in design has been tried out as yet on the proving stand. Such tests will, of course, be made before a completed rocket is constructed. Needless to say, if successful, they will have an important influence on future rocket design.

Due to the co. truction of the fuel feed apparatus, it is the expectation that both fuels will be delivered into the openings D and E as liquids on the verge of vaporization. These are repeated at equal intervals around the pipe to form two rings of fuel vents. Oxygen leaving aperture D has to travel about two inches to reach gasoline at E; in so doing it becomes vaporized.

The length of the combustion chamber may be varied by threading the firing chamber sleeve F up or down. This adjustable factor is entirely absent from rocket motors of conventional design.







A--oxygen tank
B--gasoline tank
C--pressure piston
D--oxygen inlets
E--gasoline inlets
F--motor cone
G--oxygen feed tube
H--gasoline feed tube
P--oxygen pressure safety valve
R—overall view

Detail of Rocket No. 5

Three New Rockets Being Built

(continued from page 1)

The members of the Experimental Committee are G. Edward Pendray, chairman, Carl Ahrens, Alfred Best, Nathan Carver, Laurence Manning, H. Franklin Pierce, Nathan Schachner, and Bernard Smith. The committee has been subdivided into three groups, each of which is constructing a rocket, plans of which have been approved by the committee as a whole.

The first group consists of Mr. Pendray and Mr. Smith; the second of Mr. Manning, Mr. Best and Mr. Ahrens; the third of Mr. Pierce, Mr. Schachner, and Mr. Carver.

All three rockets will have somewhat greater fuel capacity than the rocket shot last spring. All are equipped with special landing apparatus. Present plans call for the incorporation of instrument compartments in all three, where barographs, radio tone signal equipment and perhaps photographic apparatus will be carried. Altitudes of three to five miles are expected of each rocket.

Associate Membership in the Society at $3 per year may be obtained by sending the first year's dues to the Secretary, Dr. Samuel Lichtenstein, 147 West 86 Street, New York City. Information on other classes of membership may be obtained by writing the Secretary. Meetings of the Society are held monthly, except in summer, at the American Museum of Natural History, 77th Street and Central Park West, New York City.