# A FINE AMERICAN ALTITUDE FLIGHT

ON January 29 last Lieut. John A. Macready, the well-known American pilot, made a magnificent attempt to beat the world's altitude record of 39,596 ft., established by the French pilot Callizo. At first it seemed as if he would be successful in achieving his object, but, when at an altitude of 35,900 ft. — where Macready reported a temperature of 50 deg. below zero—the supercharger, which was fitted on his machine, developed trouble, and he was forced to descend. On landing, Macready appeared to be little the worse for his experience.

He was using a special altitude 'plane, known as the XCO5, which we illustrate herewith. We publish also some notes on this machine, by A. M. Jacobs, from the "U.S. Army Air Service News Letter," which, we think, may be of interest.

The P-53, Le Pere biplane, twice in tests of altitude equipment taken to heights which secured for the United States world altitude records, having well served its purpose, is about to be retired in favour of a more modern design. Its successor, the XCO5, designed and built by the Engineering Division in 1923, is at present undergoing remodelling with the expectation of being ready for the testing of altitude equipment in the near future. In looking about for a plane which, would most efficiently fulfil the conditions for altitude work several features governed. It had been decided that the new choice must be designed for a supercharger, must be lighter per wing-span ratio than the old Le Pere and adapted to being fitted with high lift wings and a propeller of large diameter. The XCO5, more than any other plane, seemed to answer this description and to more generally lend itself to the modifications which would be necessary.

*[U.S. Air Service Photo*

**MACREADY'S ALTITUDE 'PLANE: The XCO5A (400 h.p. "Liberty"), developed by the U.S. Engineering Division, McCook Field on which Lieut. John A. Macready (standing by machine) attained an altitude of nearly 36,000 ft. last week.**

Of first importance, were the wings. The type selected to give the high lift desired was the Joukowsky StAe-27A. A set of wings to this design was built in the Engineering Division shops. Of wood and fabric construction, they are heavily cambered, being extremely thick at the leading edge and tapering sharply to the rear. Gap and stagger are pronounced. They present a total area of 600 sq. ft., with an aspect ratio of 10. Mounted on the fuselage on the XCO5, they reduce the weight-span ratio to a much lower value than the plane's original wings. With these wings it is planned to use a detachable-blade aluminium alloy propeller, 10 ft. 6 in. in length with pitch adjustable on the ground.

The inside of the fuselage of the plane has also undergone considerable remodelling in preparation for the frigid journeys.

The liquid oxygen flasks, in former flights placed in the rear cockpit, have been moved to the rear of the rear cockpit with tubes and regulators carried through to the front cockpit. In the one-man altitude tests, the rear cockpit will carry the recording barographs and thermographs and be sealed over. The pilot's cockpit has been completely lined, the floor and lower half of the walls with plywood, the upper half with quilted felt corduroy which, coming around the back of the pilot's seat, forms a taut cockpit covering which fastens about the pilot's neck and extends to the cowling. Even the opening about the socket of the control stick is closed over with corduroy, the whole interior being made snug against the entrance of outside winds or draughts. Through the cowling, which is of transparent celluloid, the pilot looks down upon the instruments and controls, with each of which, some time during the flight, his eyes or hands must be busy. There he sees the altimeter, the tachometer, the air speed indicator, the variable engine pressure gauge, which indicates the difference of air pressure in the carburettor as altitude is gained, the fuel level gauge, the fuel pressure gauge, the water thermometer for water leaving the engine, the water thermometer for water leaving the radiator, the oil-pressure gauge, the thermometer for oil entering the engine, the thermometer for oil leaving the engine, the clock, the oxygen flow regulator, the Liberty engine ignition switch, the battery control switch—the plane is equipped with a dual set of batteries so that, if one runs down, the pilot can switch to the second—the emergency gasoline hand pump, the radiator shutter control, the throttle control, the spark control, the carburettor mixture control, the supercharger blast gate control, the gasoline shut-off valve and, last but not least, the airplane stick and rudder controls. In addition, will be mounted a thermometer to give the air temperature inside the cockpit and a second altimeter registering the altitude according to the Federation Aeronautique Internationale reckoning.

In former flights, a temperature as low as 82½ degrees below zero, Fahrenheit, had been encountered. To further protect the pilot from the extreme cold, an extra heating apparatus has been mounted on the exhaust manifold on the left side of the plane so that the cold air passing over the hot manifold and becoming heated, is led through a tunnel and thence into a flexible conduit which, extending into the interior of the cockpit, ends near the control stick. In this way, the warm air will be directed to the pilot's hands and the centre part of his body, though because the conduit is flexible, he may change that direction as he chooses. Dampers in the tunnel make it possible to keep the temperature from becoming too warm at the lower altitudes, a danger which, of course, will not exist higher up.

The XCO5 is powered with the 400 h.p. Liberty engine. A submerged fuel system has been adopted for altitude work; that is, the fuel pump has been placed at a level lower than the gasoline tank, thus accomplishing gravity feed from tank to pump. At high altitudes, the boiling point of fuel is reduced close to its vaporization point. Therefore, any added negative pressure imposed on the fuel by its lifting to the pump, is apt to cause vaporization, in which condition it is impossible to pump it to the engine. By submerging the pump beneath the level of the tanks, the duty of the pump is reduced to merely discharging the fuel, which, backed by an even gravity pressure, more easily retains its normal liquid