offering a five-dollar reward for its safe return.

Dr. J. Bjerknes, prominent Norwegian meteorologist who is now visiting the Massachusetts Institute of Technology, will cooperate at Cambridge with Dr. Hurd C. Willett of the Institute staff in making the forecasts upon which the release of the balloons will depend. A mid-continent location was chosen for the experiments so that the balloons will not be lost over the ocean.

The daily stratosphere soundings are being made from Omaha, Nebr., by the U. S. Weather Bureau in cooperation with the International Upper Air Commission. Data gathered by all countries engaged in the research are to be published by the Commission so that the results may be readily studied by meteorologists everywhere, L. T. Samuels of the Aerological Division of the Weather Bureau explained.

The barograph used by the Weather Bureau descends to the earth slowly beneath a parachute that opens after the balloon bursts. The balloons usually rise about eleven miles or more, and have been known to reach an altitude of twenty miles. Most of the returned instruments are found within fifty miles of the take-off, though some have been sent in from distances of several hundred miles.

Science News Letter, February 3, 1934

ASTRONOMY

Stellar Looking-Glass Slowly Cooling

A HUGE looking-glass for the stars which will eventually serve science in the 80-inch reflecting telescope of the new McDonald Observatory, in Texas, is now slowly cooling in the Corning Glass Works, Corning, N. Y.

Its temperature is dropping two to four degrees a day from the high heat that the molten glass had when it was poured. In about three months the huge disc, a foot thick, nearly seven feet in diameter, weight 5,600 pounds, will be ready for shipment to Cleveland where experts of Warner & Swasey Co. will spend from one to two years grinding its face into a very precise concave optital shape.

McDonald Observatory, whose chief telescope will have this 80-inch mirror, is being erected on Mt. Locke in the Davis Mountains of Texas. It will be operated jointly by the University of Texas and the University of Chicago.

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AVIATION

Superiority Predicted For Rotating Wing Aircraft

Research Will Make Autogiro and Gyroplane Faster Than Conventional Airplane, N. A. C. A. Engineer Believes

FLYING machines with rotating wings will be superior to the conventional airplane as soon as their possibilities for high speed are practically developed, John B. Wheatley, aeronautical engineer of the National Advisory Committee for Aeronautics, predicted to the Society of Automotive Engineers.

The autogiro and the gyroplane are the two types of rotating-wing aircraft which, according to Mr. Wheatley's analysis, have the possibilities of becoming superior to the conventional type of fixed wing airplane now widely used. The reason for the pronounced possibility of the autogiro and the gyroplane is the inherent ability of their rotors or moving wings to attain their maximum lift-drag ratio at any desired forward speed.

The novel cyclogiro, with the paddle-wheel wings, is rated by Mr. Wheatley as being approximately equal in merit to the airplane, while the helicopter is definitely inferior.

The autogiro is the best known of all rotating-wing aircraft. It was invented by Juan de la Cierva, and the American version of the autogiro which has been flown extensively in this country was produced by Harold F. Pitcairn, working with the Spanish inventor.

Gyroplane

The gyroplane is sponsored by E. Burke Wilford of Philadelphia. The autogiro and the gyroplane present a very similar appearance with blades that rotate freely under the action of air forces about a vertical axis, replacing to a large extent the conventional wings of the airplane. Mr. Wheatley explains that the aerodynamical principles of the autogiro and gyroplane are practically identical and that their differences are largely structural.

"The low-speed control is superior to that of the airplane," Mr. Wheatley said in reference to the autogiro and the gyroplane. "The reliability is equivalent to that of an airplane, and emergency landing will be easier. The low-speed performance is superior to that of an airplane. Airplane high speeds will probably be exceeded. Control system is as simple and easy to use as that of the airplane. First cost will be slightly higher, but maintenance and operating costs will be equivalent to that of airplane."

The rotating-wing type of machine is likely to be used by the private flyer and the unskilled pilot because of its increased safety and the smaller landing field required for it, Mr. Wheatley emphasized. Almost all the hazards encountered in flying an airplane are connected with the phenomenon of a gradual weakening of control as the flying speed approaches its minimum, he explained. As minimum speeds range from 50 to 75 m.p.h. an undesirable premium is placed upon piloting technic during landings and take-offs. A rotating-wing aircraft suffers very slightly from these handicaps because the relative velocity of the lifting surfaces to the air is independent of the translatory velocity of the machine and is always large, so that the angle of attack of the lifting surfaces is well below the burble point. The resultant performance of rotating-wing aircraft thus materially extends downward the low-speed phase of flight, lessening the piloting skill required for emergency landings and take-offs, and making the pilot more independent of meteorological conditions because at low speed a shorter visibility is required for the same safety.

Cyclogiro

The cyclogiro, which Mr. Wheatley rates as being approximately equal in merit to the airplane, is of such recent origin that it has not yet been demonstrated at full scale. It consists of a fuselage of conventional form, supported in the air by power-driven paddle-wheel wings, one on each side. The paddle-wheel rotors perform the functions of both the wings and the propeller of the conventional airplane.

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