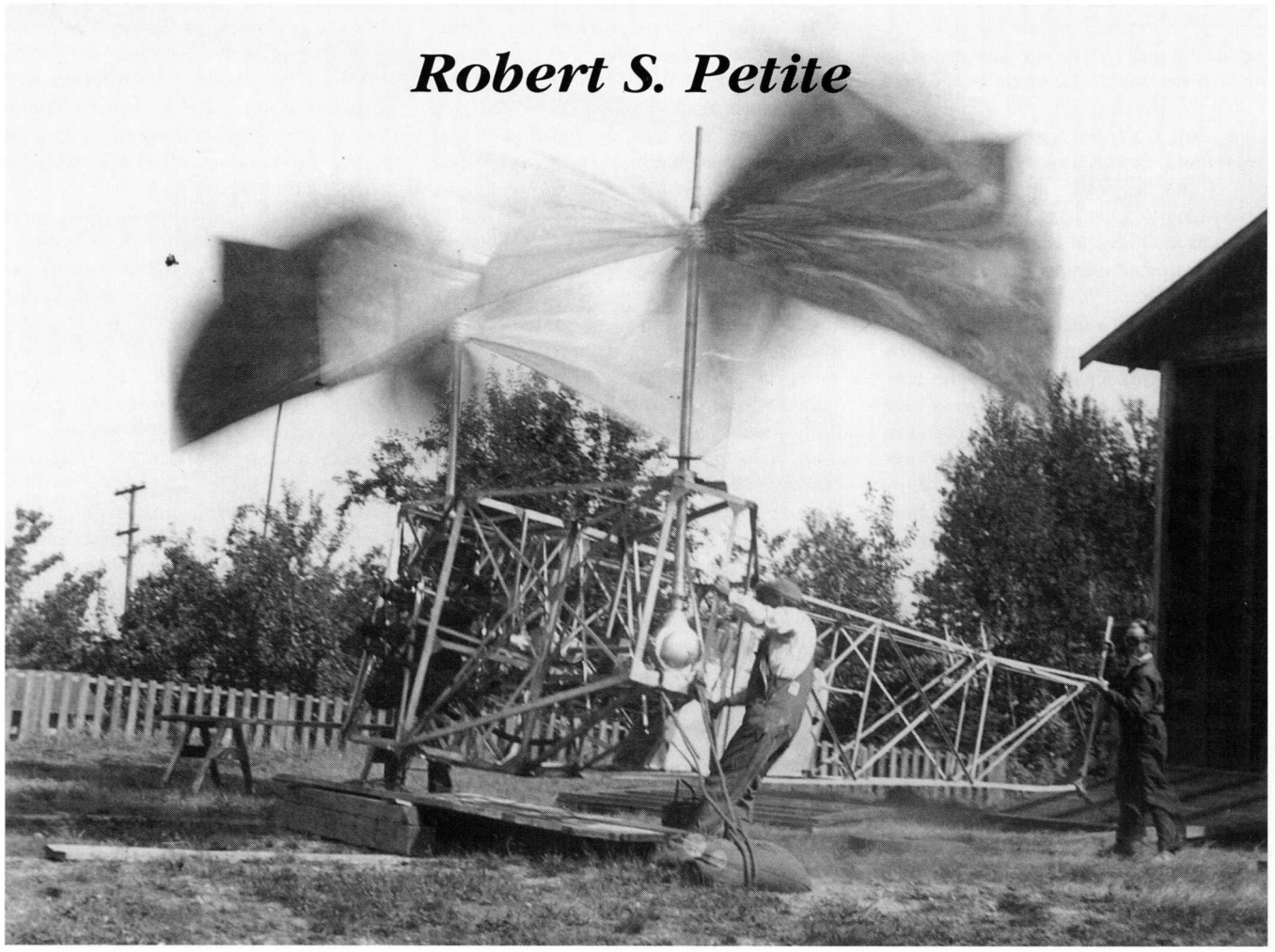
Robert S. Petite



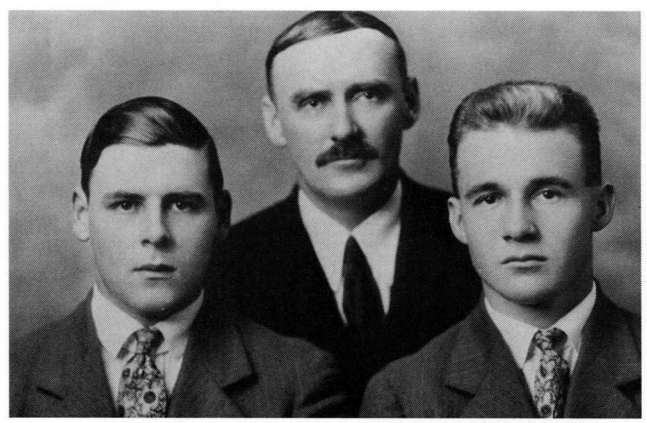
THE JOHN HESS HELIOPLANE

The Dawning of Rotary-Winged Flight in Canada

While the modern helicopter is now a familiar sight in Canadian skies, this once radical type of aircraft experienced severe growing pains before it was accepted by the aviation industry. Its history is relatively short; commercial rotorcraft have been around for less than 50 years.

Leonardo da Vinci is regarded as the first man to conceive of a rudimentary type of rotary wing about the year 1500. Over the next several hundred years, many others tried to solve the problems of rotary-winged flight; but without success. Not until 1936 was Louis Breguet, a Frenchman, to become the first to fly a prototype helicopter successfully But it was Focke-Aghelis in Germany, prior to and during World War II, that first designed and flew a practical helicopter, putting them into limited production. Unfortunately (or not), allied bombing curtailed development.

Igor Sikorsky, a Russian immigrant to the USA, is now considered the father of the helicopter industry. Although he had built an unsuccessful rotor-craft back in Russia, he did not return to rotary wing development again until the late '30s after building a popular line of flying boats. On 14 September 1939, he flew his new prototype, the VS-300. From this ungainly, awkward looking machine, Sikorsky eventually developed the first helicopters to go into full production and service during World War II.



Few are aware of the contributions made by several Canadians to

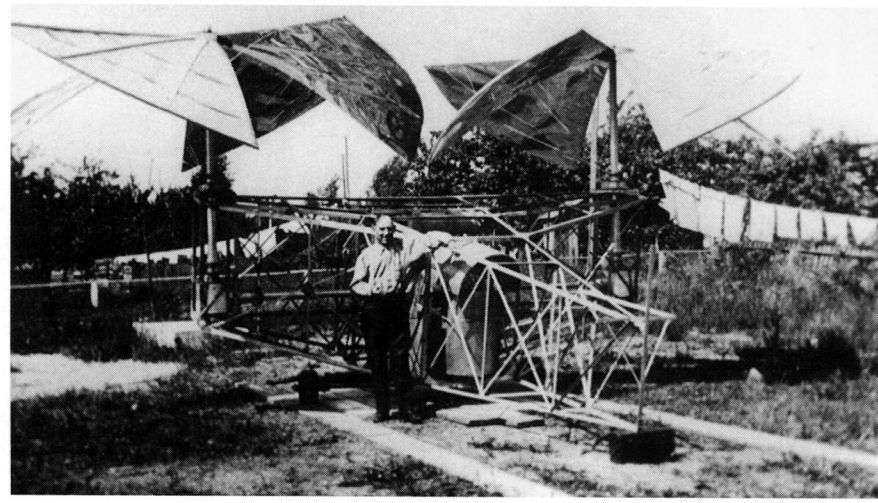
the design of rotary-winged aircraft during the late 1920s and early 1930s including construction and a few rudimentary flights. The Froebe brothers of Homewood, Manitoba, designed a contra-rotating blade system powered by a Gipsy engine and attached to a rectangular open-frame tubular box on three wheels. On 21 December 1938, Douglas Froebe was able to coax the craft to a height of almost three feet. It shook and vibrated, but was able to land safely. The Froebe machine — Considered to be Canada's first helicopter — is in the collection of the Western Canadian Aviation Museum, Winnipeg, Manitoba.

Even prior to the Froebe Bro-thers' flight, another Canadian, John E. Hess of New Westminster, British Columbia, had experimented with a prototype aircraft complete with two lifting rotors. This machine actually hovered, tethered by ropes, prior to Igor Sikorsky's first flight of the VS-300 in the United States. Yet very little has been written or documented about this important part of Canada's aviation past.

John E. Hess Sr, while a youngster growing up in Bavaria, Germany, had the opportunity to witness men's early attempts to fly; the thought of soaring in the air intrigued him. Fascinated by birds as they glided in the air currents, he was especially intrigued by the hummingbird, which could rise straight up and stop, motionless. He believed that some day man would invent a machine that would emulate the hummingbird.

Immigrating to Canada in 1907, John Hess and his family settled in New Westminster, BC and soon started up a bricklaying business. His company was to become very successful. But his thoughts about the ideal flying machine never left him. Hess promptly began the designs for an aircraft he called a *helioplane*, which would be capable of rising vertically into the air and landing safely in a small clearing or on a rooftop In 1912, as work progressed on the final design, Hess tried to solicit other businessmen to join him in his venture, so that a working model could be constructed. Many thought his ideas had potential; but no one would come up with the money to assist him. It wasn't until late in 1927 that Hess would seriously return to his dreams of building a prototype model. His bricklaying business had flourished and he was able to set aside sufficient funds for the helioplane project. Hess's two sons, John Jr and Harry, set about beginning tests with a model in a shed in the back yard of their home on Cumberland Street.

Heading illustration: *in this 3/4-front view the Hess Helioplane hovers with assistants holding it for stabliity.* ***Opposite, bottom:*** *John Hess Jr (L) John Hess Sr and Harry Hess (2nd son) MRS C. ROHLFS, (daughter of John Hess Sr).* ***Below:*** *the Helioplane in an obvious backyard setting — with washing on the clothesline. The individual is unknown.* ***Bottom:*** *from the cover of a promotional brochure, an artist's interpretation of how the Helioplane would eventually appear.* All black and white reproductions are from the HESS COL held by ARCHIE MILLER and are courtesy of MRS CHARLOTE HESS.

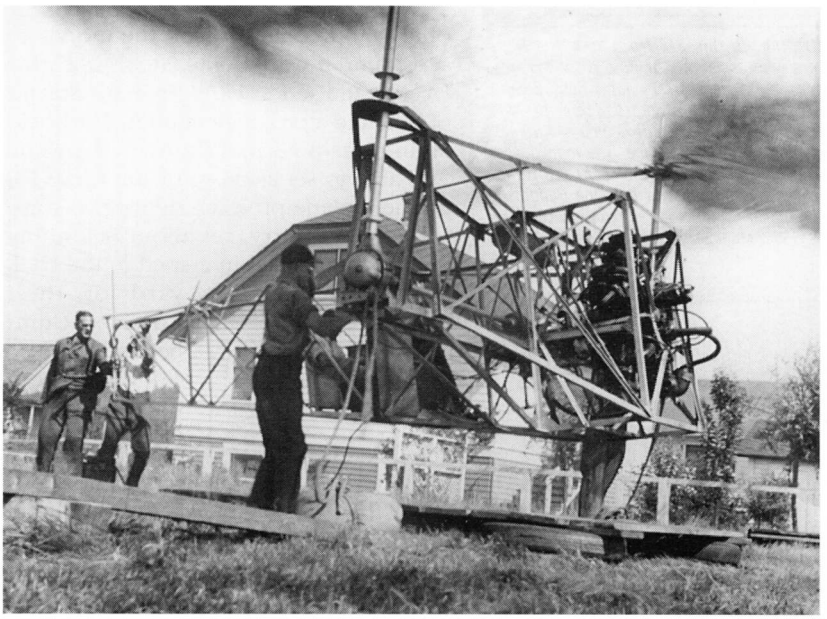


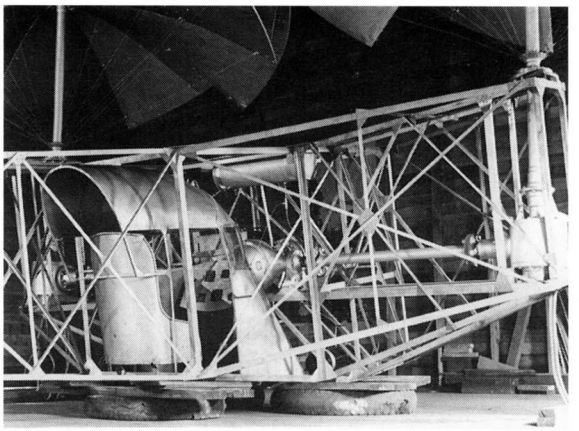
For More Than Two Decades, John Hess Pursued His Dream of Perfecting a Rotary-Winged Aircraft.

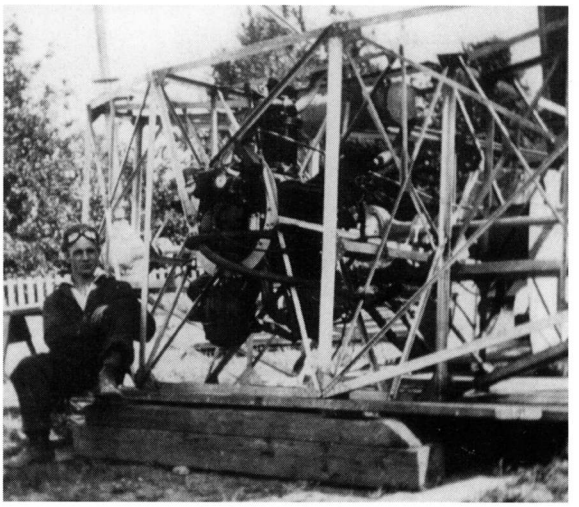
In New Westminster, on 24 October 1928, John Hess Sr formed a company, the John Hess Helioplane Company Limited, with a capital of $70,000 and 700 shares. Directors of the company included: John Hess Sr, President; G. Emerson Gilley, Vice President; Alvera Ward, Secretary-Treasurer; John Hess Jr, and Francis G. Wrightson.

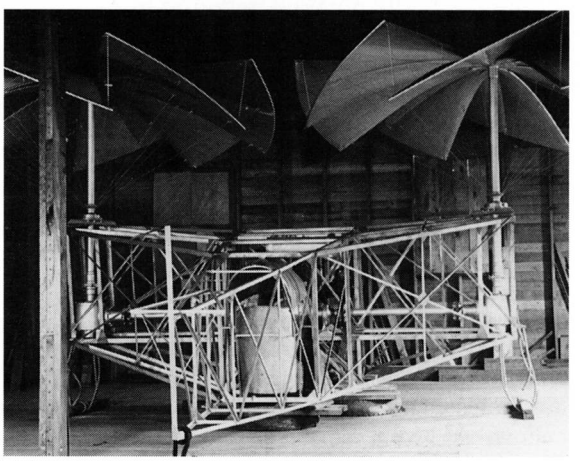
Much experimenting and actual testing took place prior to constructing a model propeller that would need horsepower in order to drive it. As tests were taking place, John Hess Sr began applying for patents on his helioplane, seeking an international patent in November 1928. An umbrella was used in tests in order to determine the type of propeller which would be used on the flying model. Construction began on propeller blades made from oilcloth and thin cedar strips attached to a metal disk on the top of a vertical metal shaft driven by a two-horsepower engine. Tests showed the motor would lift 16 pounds per horsepower at 250 rpm. Varying the speed of the engine allowed the model propeller to descend and rise vertically. It was now time to begin the working model.

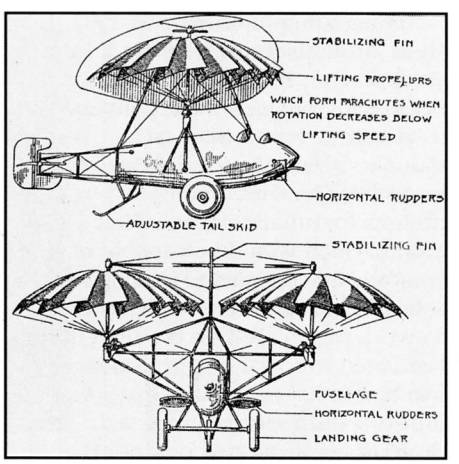
The full scale prototype was constructed around a 28-horsepower Lawrence two-cylinder aeroplane engine. The two nine-foot propellers were made of drill cloth, cedar strips and wire. A belt from an automobile engine was used to start the aeroplane engine. The very first test ended in disaster — the propeller blades were destroyed with debris scattered throughout the shed. The propellers' speed developed an excess of lifting power causing the destruction of the rotor blades. Large crossbeams in the shed had prevented the machine from rising more











Above: *from the right, 27 June 1938, the helioplane hovers a couple of feet above the ground with Carlotta Hess (daughter of John Sr) in the pilot's seat. Right, top: 3/4-rear view of the pilot's compartment behind the Kinner engine, within the duraluminum frame.* ***Right:*** *Harry Hess seated beside the Helioplane's Kinner engine.* ***Right, lower:*** *from the rear, the rotors and drive mechanism are apparent. Right, bottom: a drawing of the Helioplane which appeared in the New Westminster, BC, newspaper of 17 December 1928.* ***Opposite:*** *from the front, the Helioplane on temporary undercarriage in front of its shed.*

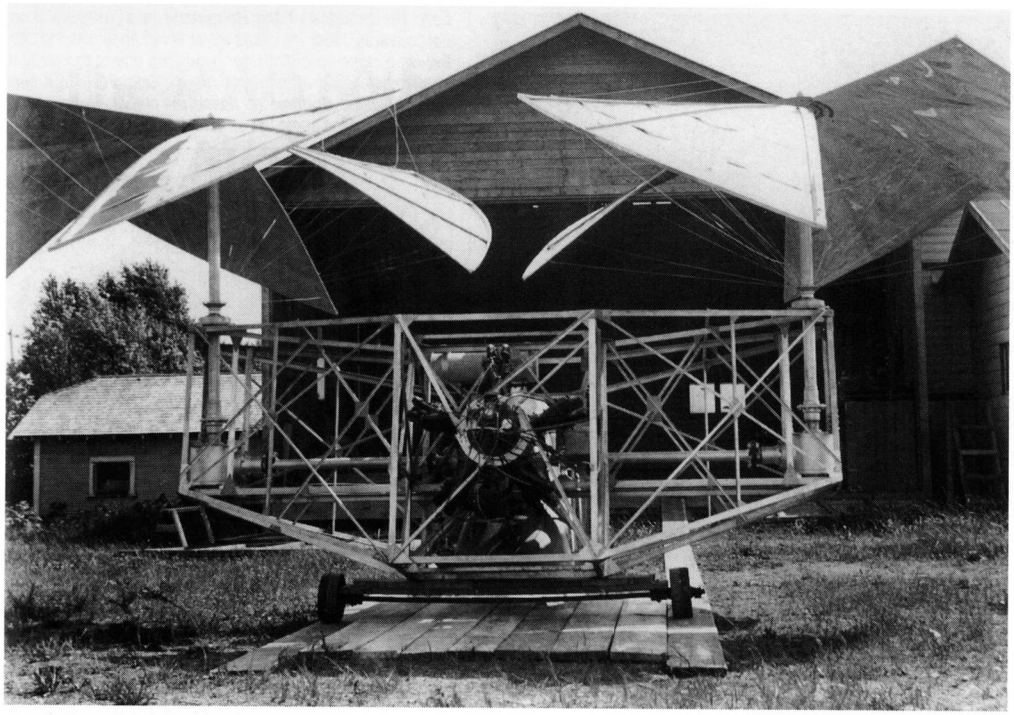
than a few inches. Fortunately, no one was hurt.

Undaunted, the Hesses constructed new blades. Succeeding tests were more successful. Rpm were kept to 200, and the 530 pound weight of the model was able to rise up with no problems. News of John Hess Sr's experiments in rotary-wing flight began to spread. The local newspaper, the *British Columbian*, published a front page article on 17 December 1928 entitled, "*Local Man Hopes to Revolutionize Flying.*" The article claimed, "John E. Hess Sr. has perfected a helioplane which the inventor predicts will revolutionize aviation. The machine which combines the principles of a helicopter and an airplane rises vertically, and can be brought down in a space of less than 30 feet square ..."

Hess claimed his helioplane would be safe for all passengers. Two duraluminum propellers or rotorblades, fastened to vertical shafts rotate inwards when viewed from the front of the aircraft. Set at an angle of 15 degrees, the blades are hinged with the trailing edges hanging down when not in motion. During climbing, the blades are horizontal. When the helioplane is descending, the trailing edges are elevated to form the shape of a parachute, which helps to slow down the aircraft. A large fin between the two propellers would help to stabilize the helioplane during flight in rough air and during landing. The pilot could release a parachute attached inside the hollow fin to slow the craft down, should the propellers become damaged. The helioplane's direction was controlled by two horizontal stabilizers at the front and rear of the aircraft, and by a rear vertical rudder. The helioplane was also able to rise after a short running take-off. Hess claimed the rotary-winged aircraft could not crash, as it would always remain upright in flight, and float down should the engine stop. It would also be capable of hovering in the air.

The engine, providing power to the two large propellers, would lift four times as much weight per horsepower and use much less fuel than an ordinary aeroplane. The starter was similar to that in an automobile, and a clutch would allow the aircraft to rise as slow or as fast as needed. Due to the low rpm of the propeller blades,the helioplane was expected to be very quiet. Costs were predicted to be much lower than for a contemporary aeroplane.

During a directors' meeting on 17 May 1929, authorization was given for John E. Hess Sr to begin developing specifications, plans and other necessary details and establish prices for the construction of a new model of the helicopter. Patents were received from several more countries. Hess Sr visited the Aluminum Corporation of America plant in Los Angeles, California during 1930, and obtained duraluminum to be used in the



". . a very high rate of speed is promised, based on the amount of power applied."

construction of the helioplane framework. He conducted further experimental tests with propellers over 1931. Construction of the duraluminum riveted angle-bar frame commenced in the fall of 1932. Assembly had been held up for several years due to finalizing the intended type of propellers to be used in the construction of the rotor blades. The aluminum sheets could not be obtained until 1932.

A prototype was assembled in 1933 with power came from a 100-horsepower Kinner engine coupled to a heavy gear transmission. But Hess could not get the helioplane to rise, even after obtaining a 200 horsepower motor. Lighter transmission gears were later designed and built. First tests were made with up to eight blades attached to the rotor shafts. Testing continued during 1934; but the final configuration of a full size machine with larger propellers was not to be decided upon until 1935. Patents were obtained from close to 43 countries. Mrs Charlotte Hess, wife of John Jr noted, "According to John, Germany, Russia, and Japan were greatly interested in the Hess helioplane, but would not take out patents unless it was built in their countries. John Hess Sr, although from Germany, wanted to build it in Canada, the land of his adoption."

1935 Helioplane Specifications

Weight (including pilot) - approximately 2,000 pounds
For testing purposes, machine constructed much heavier than necessary

Dimensions
- width: 26 feet 2 inches
- length (exclusive of nose cowling): 17 feet 2 inches
- height (bottom of frame to top of propellers): 10 feet 10 inches

Material
- duraluminum angle-bar; rivetted joints.

Propellers
- two, each 13 feet in diameter, constructed of 4 blades, 30 gauge aluminum sheets back ribbed with 1/2 inch by 3 inch spruce. This type of construction is for testing purposes only. Total area of two propellers about 260 square feet. Earlier configurations had more than four blades.

Engine Power
- Kinner radial air-cooled motor capable of developing 210 horsepower at 1900 rpm, and 240 horsepower at 2100 rpm

Starter
- Electric 12 volt hookup.

Gear Reduction
- ratio 10:1 from engine to propellers.

Wheeled Undercarriage
- none at this time.

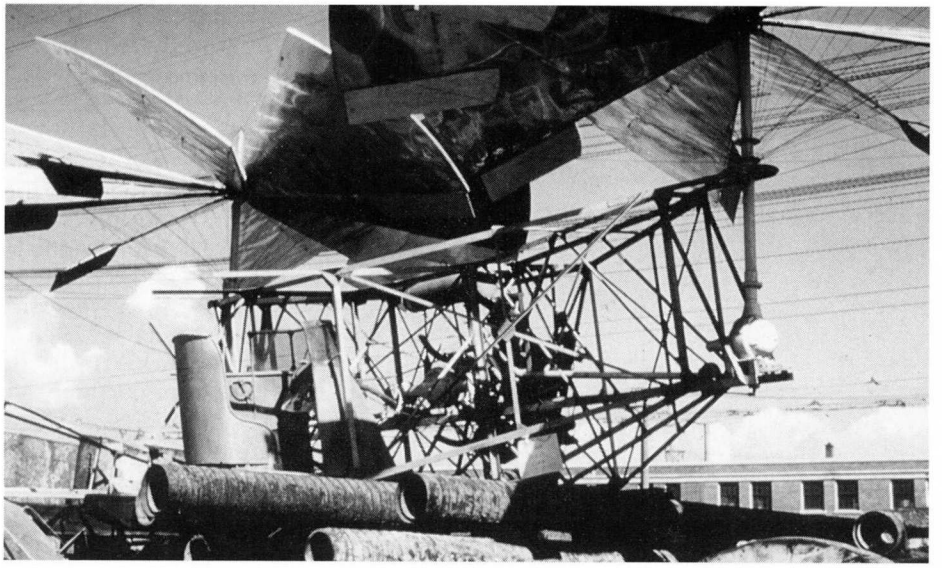
Cockpit
- seat for pilot only.

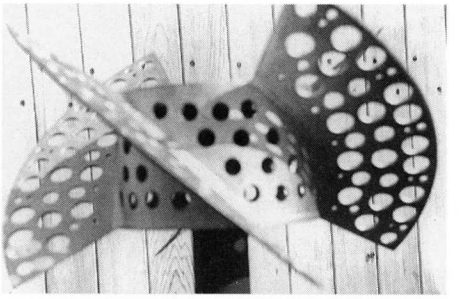
John Hess Jr was the pilot for the first ground and hover test flights. The actual first hovering is believed to have taken place in July, 1935 with Hess Jr. at the controls. A photograph taken 26 July 1935 noted on the back, "The helioplane hovered approximately 14 inches above the landing platform for four minutes, and then by retarding the gasoline control, the machine was lowered to within two inches and caused to hovered for a short time before landing. Had it been so desired, the pilot could have caused the machine to hover for a much greater length of time. The motor was turning 1850 rpm, with the throttle slightly more than half open." Ropes and sand bags tethering the helioplane are shown in the photograph.

John Hess Sr remarked in a letter of August 1935 that, "Our tests have been very satisfactory. On numerous occasions, the machine has ascended vertically from the ground under its own power, and has hovered as low as one foot from the ground, always with a pilot in the seat. It is possible for the pilot to descend at as low speed as he desires. Up to this point we have not permitted information regarding the helioplane itself, or its performance to be printed in the press or motion pictures to appear in newsreels."

By early January 1936, Hess Sr was soliciting other aircraft manufacturing companies in order to begin giving demonstrations. In a report dated 27 January 1936, John E. Hess Sr remarked, "Stability of helicopters is one of the difficulties many inventors have failed to overcome. We designed our machine on the basis of slow propeller speed, having all the weight below the propellers, and designed a special automatic stabilizing device. Once the propellers have taken the weight of the machine, a very high rate of speed is possible based on the extent of power applied. By manipulating the elevators, the helioplane may be brought into forward or backward flight. Hovering is possible in midair at any desired height by simply increasing or decreasing the motor speed. This we now have successfully accomplished."

In February 1937, Hess Sr contacted the Honorable A. W. Gray, Minister of Lands, Government of British Columbia, regarding interest in his invention. Hess





Left: *the remains of the Helioplane in a junkyard near Vancouver in 1950. Its ultimate fate is not known.* G. PETERS. ***Below:*** *a close-up of the rotor head atop one of the vertical shafts, providing attachment for the four 30-gauge aluminum blades.* ***Bottom:*** *the Helioplane at rest. The seeming complexity of the angle bar structure is apparent.*

Sr also wished to meet with the Honorable I. Mackenzie, Minister of Defense for the Government of Canada. The Canadian Government was planning on augmenting the defense of the Dominion, and Hess Sr. wanted to demonstrate the present particulars of his helicopter flying machine.

By the fall of 1937, Hess Sr. was sending financial propositions to numerous companies and individuals. He wanted to raise capital of $50,000 in order to construct and satisfactorily prove an updated helioplane, plus up to $2,000,000 in order to go into production and market his invention. This could involve setting up a new company. Expenditures to date, including the cost of two models, the prototype helioplane, patents, and related expenses was close to $33,000. This did not include the inventor, and two assistant's labour over a period of ten years.

During 1937, Hess's company continued to try to interest others in joining him in order to obtain capital for further development, and turned their attention to improving and redesigning an updated clutch, plus testing propellers for greater efficiency. A number of blades were tested with different pitches and camber, resulting in the construction of a new eight blade propeller. Greater lift capabilities were anticipated.

The Minister of Defense, in February, 1938 had the chance to review a report on the Hess helioplane. His response was, "No immediate use for the invention as inspected can be visualized either for military or civil purposes. A satisfactory helicopter may have uses for such purposes as military observation, but it is felt the Hess helioplane is a long way from final development. It is felt the Hess helioplane has no immediate value, and there is no indication that any useful knowledge can be gained by advocating further development. In short, the machine is out of date by twenty five years or more."

Hess Sr. was disappointed but decided to continue his experiments throughout 1938. Several different types of propellers were tried, the width of the machine extended by 18 inches, propeller shafts strengthened, and lateral stabilizers constructed. One test with the new stabilizers warped the main rotor shafts, damaging the propeller blades.

As 1939 approached, Hess Sr. began constructing a unit to govern the lateral stabilizers. He also started assembly of a tail unit which would allow the pilot to have complete control of the helioplane during tests.

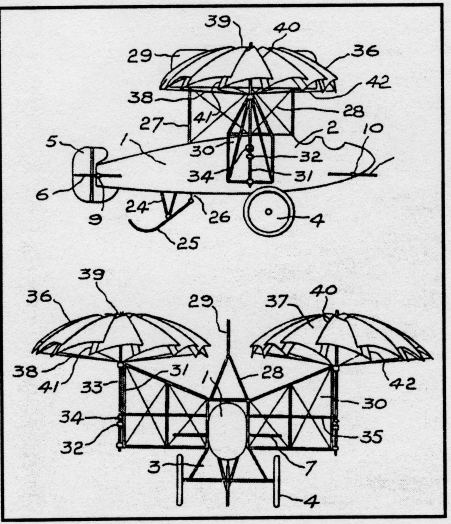
Testing continued into 1939. During one experimental flight, the right propeller gear assembly was sheared. An outside company produced a new set which worked satisfactorily, producing additional power and efficiency. Attention was given to lateral control again, changing to an air system from oil, resulting in faster and smoother operation. Hess was confident and felt he was in the position of demonstrating the helioplane to others. He believed 1939 was the best year to date, with the success of his helioplane. He was confident he would be able to find someone to advance the helioplane's manufacture.

Hess's experiments with the helioplane were progressing satisfactorily in 1940. Lifts were being accomplished easily. The pilot was able to rise and hover the rotorcraft through stick control, use of the throttle, and movement of the stabilizers. The machine would sway gently from side to side and recover from any lateral position at will.

1941 was not a good year. Due to the war affecting Canada, further development on testing the helioplane was suspended temporarily. The rotorplane was kept serviced in running order, to be used for demonstrations as required. Restrictions on gasoline use, and obtaining aluminum materials combined to cease all work on the helioplane. Hess Sr. hoped the Canadian Government would release funds for aviation research and development.

In April, 1941, Hess Sr. received a letter

JOHN HESS HELIOPLANE continued on P.110



from the United Aircraft Corporation for whom Igor Sikorsky worked. The engineering department had reviewed motion pictures, photographs, and experimental data on Hess's helioplane which John Sr. had sent to them in early January, 1941.

The letter stated, "Our engineers in charge of our helicopter project have examined all material with interest. A

Another drawing of the Helioplane, prepared for patent purposes, possibly earlier and differing in some respects from the previous drawing. HESS.

construction using wide blades, rigidly connected to the shaft was considered by Sikorsky but abandoned. The stability automatically obtained by your machine, on the pendulum principle is not sufficient to meet all operating conditions. It is nevertheless difficult to form a conclusive opinion since your development work is still in such a preliminary stage."

John Hess Sr was very disappointed. All work on his prized invention had come to a standstill. He had never completely lost his passion to perfect a rotary winged aircraft. He was still attempting to interest others on the value of his helioplane as late as 1943. Eventually the project was abandoned. The hulk of the helioplane's final resting place was in a junk yard near Vancouver, BC around 1950. No one knows where it disappeared to after that. Another aspect of Canada's aviation history gone forever. John Hess Sr., a pioneer in Canadian rotary wing aircraft development, passed away in 1954. All remaining documents, data, photographs, and motion pictures were eventually placed in the care of Irving House Historic Centre in New Westminster, B.C. by Mrs. Charlotte M. Hess, widow of Mr. John E. Hess Jr.

SOURCES :

- *Mrs. Charlotte M. Hess* (John E. Hess Jr.)
- *Mrs. Carlotta Rohlfs* (daughter of John E. Hess Sr)
- *Mr. Archie Miller*, "Our Forgotten Past" - Curator, Irving House Historic Centre, New Westminster, BC
- *Valerie Francis* - Irving House Historic Centre
- *Gordon Peters*
- *Nick Duben*
- *The British Columbian*, December 17, 1928
- *Canadian Aviation*, February 1929