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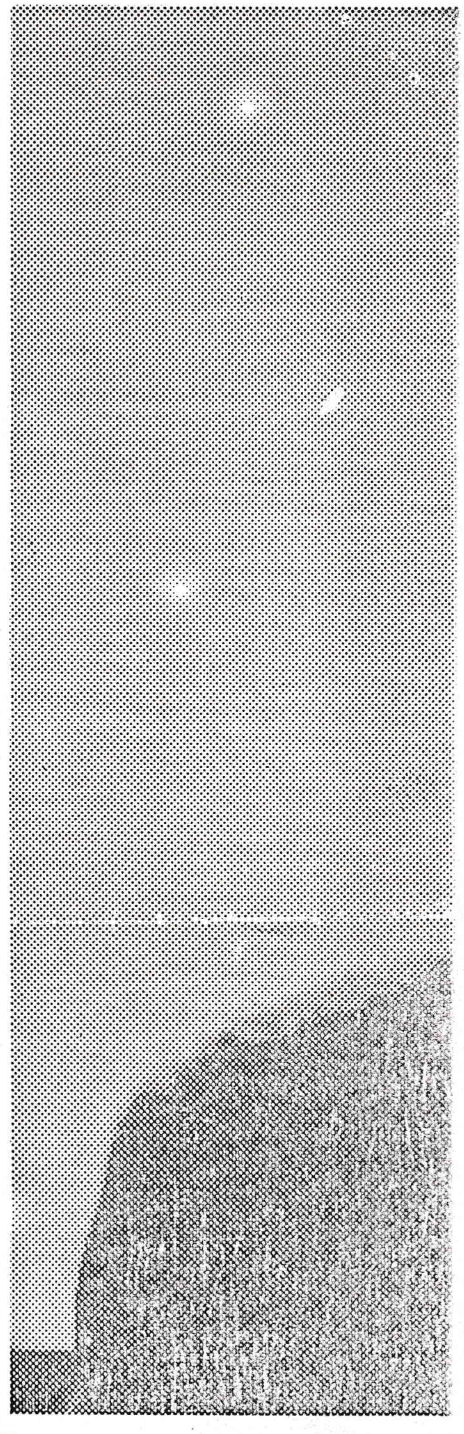
Back in the dim days when airplanes were crude aeronautical experiments, he invented a jet plane, then a flying saucer, then...



the prowling mind of Henri Coanda

by G. Harry Stine

IN 1910, the first jet airplane was flown near Paris. In 1915, the first strategic bomber with a range of 1,000 miles was flown in France.

In 1918, a rocket cannon similar to the present "bazooka" antitank rocket was tested near Le Havre, France, several months before Dr. Robert H. Goddard built a similar device in America.

In 1921, prefabricated houses of steel and concrete were being erected in France and Belgium.

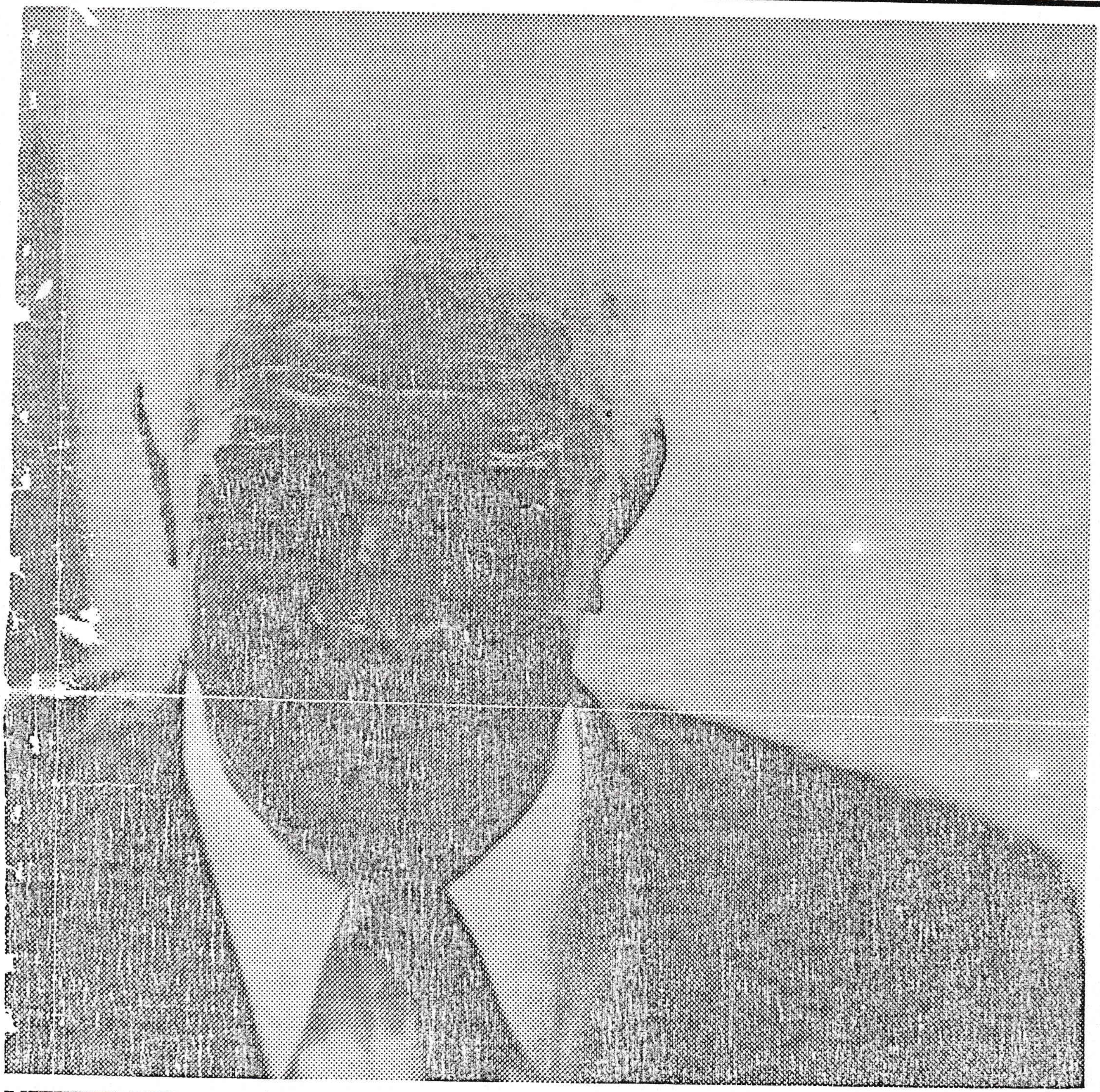
In 1935, the first flying saucer was designed.

The man responsible for all of these sweeping and advanced inventions is Dr. Henri Coanda, a Rumanian scientist and engineer who lives in Paris. With over 33 basic United States patents in his name covering a range of subjects from the first jet engine (1914) to soil regeneration and sea-water desalinization, Dr. Coanda certainly ranks as the most inventive man alive.

He has been inventing for over 50 years and is still at it. Unlike many other inventors, Dr. Coanda turns out new devices that are not merely improvements on established ways of doing things, but advanced new approaches to the problems of the modern world.

Take his jet airplane, for example. In 1906, while visiting the aeronautical pioneer Captain Ferdinand Ferber, Coanda saw Ferber's box-kite airplane powered by a propeller. He told Ferber, "It is the string pulling your kite that bothers me," and proceeded to reveal to Ferber the concept of jet propulsion of aircraft that had flashed into his mind at that instant. It took him four years and $200,000 to turn his concept into a reality.

No single man today could easily afford this sort of expenditure, but General Constantine Coanda of Rumania, his



father, provided most of the funds. To gain the necessary knowledge to build his jet, Henri Coanda attended the University of Liege, Belgium, and graduated in the first class of the *Ecole Superieur de Aeronautique*, the world's first aeronautical engineering school.

Coanda had to invent nearly everything for his jet airplane. He went to such aviation pioneers as Ernest Archdeacon, Gustave Eiffel, Paul Painleve and Louis Bleriot, but they could not help him. Coanda decided to experiment to get the information on airfoils, structures, materials and stability that he needed. He built a wind tunnel in 1909 that permitted him to photograph air flow around various shapes. To learn about supersonic airflow for the design of his jet engine, he developed the first method of photographing bullets in flight.

To gather aerodynamic data on airfoils, he got permission from the authorities to mount a test balance in front of a railway locomotive. During the winter nights of 1909-1910, Coanda rode on the front of this locomotive traveling at high speed between Paris and St. Quentin, making his measurements with the night wind whipping past him. The result was the world's first thick airfoil section, quite a contrast to the thin cambered wings then used on airplanes.

His jet engine was unique. A 50-horsepower water-cooled piston engine, built by Pierre Clerget, drove a centrifugal compressor that sucked in air and blasted it back into a shroud at high pressure. Coanda then ducted the Clerget engine exhaust into this compressed air, added a spray of raw gasoline, and ignited the mixture. The result was a turbine propulsion unit that generated 484 pounds of thrust. (The first turbojet engine designed by Sir Frank Whittle in England in 1939 generated just 600 pounds of thrust.)

The airplane in which Coanda mounted this engine was as unusual as the engine itself. It was constructed completely of molded mahogany plywood. Its two thick wings were cantilevered from simple struts at their midsections with none of the wires and braces common to airplanes at the time. The landing gear retracted into the lower wing. The gasoline tank was buried in the thick upper wing. The aircraft was aerodynamically clean, fast and far ahead of its time in 1910.

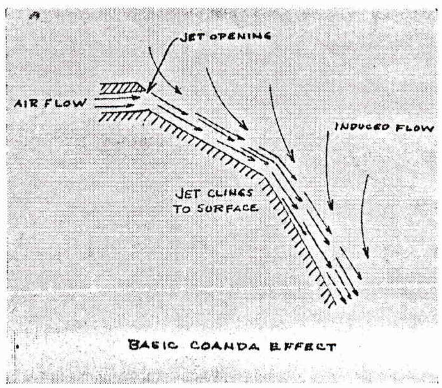
Henri Coanda tested his jet airplane at Issy-les-Moulineau outside Paris on December 10, 1910. Here is how he described the test of the first jet airplane:

"I had not intended to fly the plane that day, but merely to determine how to control it on the ground with its jet running. The engine worked well in the shop. But when I mounted it in the aircraft, the heat from the two jet exhausts coming back alongside the cockpit was too much for me. Therefore, I added two simple flat plates on the top and bottom of each jet exhaust to keep the heat away from me. The exhausts were, of course, angled away from the wooden fuselage so that they would not set the plane afire. When I got into the open cockpit and started moving the airplane along the ground, I saw at once that something was wrong. The jet flames would not stay in their asbestos exhaust pipes. They came out of the pipes and hugged the fuselage sides. Being afraid that the plane would catch fire, I gave my full attention to adjusting the jet engine and did not notice that the craft was gaining speed. Then I looked up. The walls of Paris were right in front of me! I had no room to stop or turn around, so I tried to fly over them. But there had been no one to teach me how to fly, and my machine was new and different. I made the machine climb too steeply, and it stalled. The left wing dropped, and my plane crashed to the ground. I was not wearing a seat belt in the open cockpit, so I was thrown clear of the crash. I came to, feeling as though every tooth in my head had been jarred loose. My jet airplane was burning a few yards away."

In spite of the crash, it was the first jet airplane. Major Victor Houart, an eyewitness, has stated that the craft did fly and described how cavalry officers exercising their mounts on the field at the time had to gallop out of the way of the plane as it flew at low altitude across the field before it climbed and stalled.

Henri Coanda was granted his first U.S. patent (No. 1,104,963) in 1914. It covers not only the jet engines, but also the fluid transmission for automobiles.

The Coanda Effect concerns the tendency of a moving jet of air or water to adhere to an adjacent surface. It has wide application in the growing new field of fluid valves and amplifiers.



A/Pilot's cabin
B/Moving platform
C/Fixed platform
D/Universal joint (entire cabin rotates to face direction of flight)
E/Gyroscopes
F/Coanda nozzles
G/Steam collector
H/Steam feed pipe
I/Horizontal blowing nozzle
J/Collector
K/Steam cooler & heat exchanger
L/Boiler
M/Burners
N/Collector
O/Universal joint
P/Lifting devices (these tilt for control)
Q/Perforated top surface of wing
R/Lower surface of machine
S/Water tank
T/Fuel tank

Right: This VTOL machine has no moving parts, derives lift and forward thrust from Coanda Effect, and is steam-powered. The operating principle is similar to boundary layer control, and the jet flap.

A year later, Coanda designed and built the world's first twin-engined airplane, which he flew at the military competition at Reims, France. Again, his inventive genius created the new and unusual. The early rotary airplane engines were plagued with a great deal of torque because of the fact that the crankshaft was bolted to the plane and was therefore stationary while the cylinders and crankcase, attached directly to the propeller, spun around. The large mass of the rotating engine created not only a gyroscopic effect but also a torque that tended to cause an airplane to roll. To eliminate this problem, Coanda mounted two engines on opposite sides of the fuselage so that their torque cancelled out. Their power was transmitted through a differential gear box similar to that in the rear end of an automobile, and this in turn spun a single shaft that drove a four-bladed propeller. The machine flew well, but more conventional wire-braced box-kite types dominated the competition.

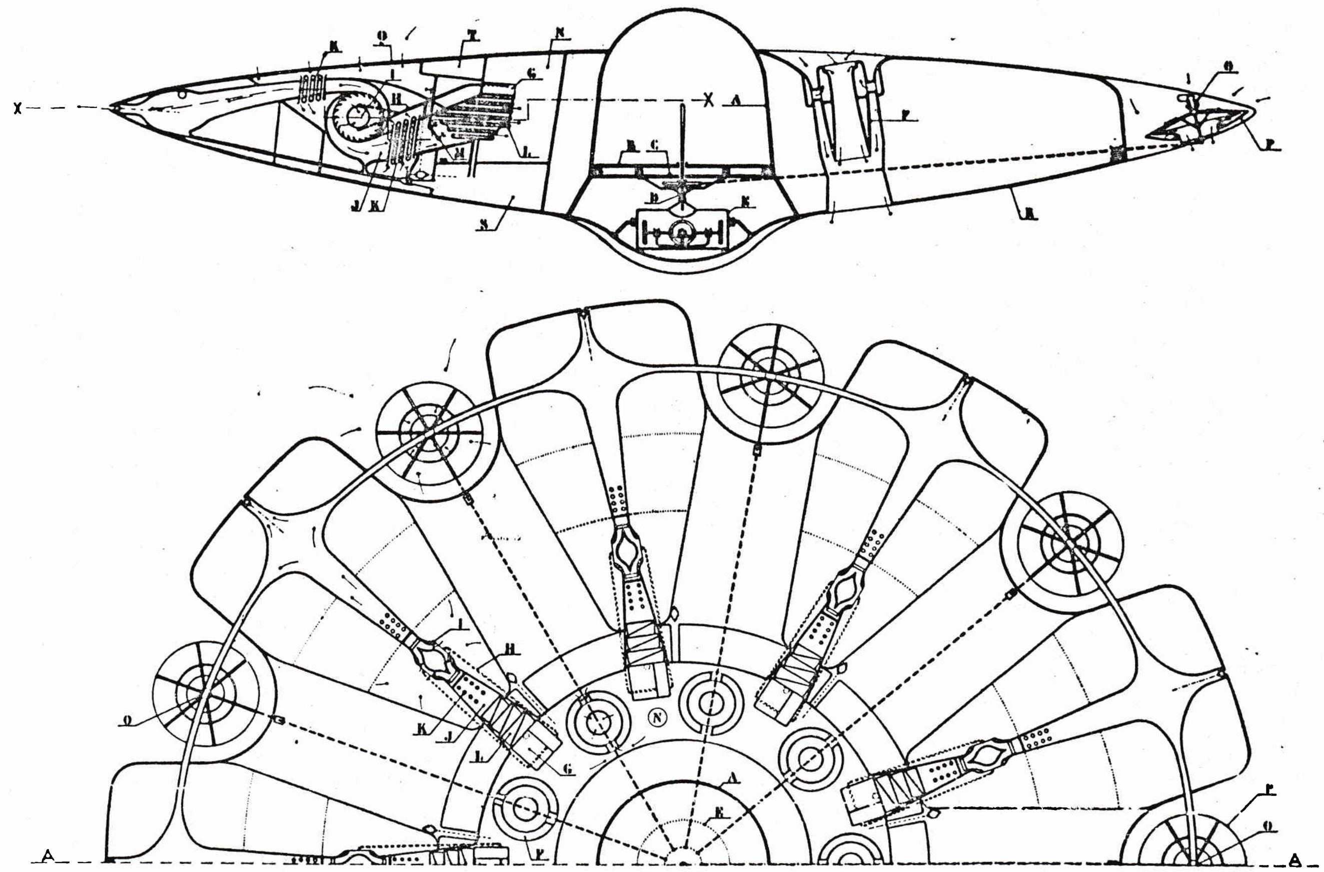
However, Coanda's activities came to the attention of Sir George White, who brought him to England to become chief engineer of the Bristol Aeroplane Company, Ltd. While at Bristol from 1912 to 1914, Coanda exerted a profound influence on the British aircraft industry with his Bristol-Coanda Military Monoplane, the most advanced aircraft in the world at the time.

One of Coanda's most active periods was during World War I when he served the French government as an airplane builder. In 1916, his two-place strategic bomber covered a distance of 1,000 miles nonstop during tests. The war ended, however, before he got it into production.

In another military-inspired move, Captain Charles Nungesser, the famous French aviator, asked Coanda to develop a potent airborne attack weapon. The result was a 5.5-inch rocket-powered shell. Coanda developed the entire system—launching tube, rocket engine and shell. It was tested at Le Havre in August, 1918, and had a range of over a mile. Nungesser intended to mount this on fighter aircraft because it had no recoil. This pioneer work by Coanda was several months ahead of similar work in America by Dr. Robert H. Goddard.

In 1932, Coanda turned to research and invention as a full-time occupation.

Coanda's Lenticular Aerodyne (Flying Saucer to you)



Within months, he had discovered the famous Coanda Effect, the tendency of a moving jet of air or water to adhere to and be deflected by a surface adjacent to it.

Coanda Effect, so named by Professor Albert Metral, who performed the mathematical analysis of it in 1939, is the key to the new field of "fluid amplifiers." In these devices, now emerging from the laboratories of several large companies, molecules of gas or liquid are used in ways analogous to the way electrons are used in high-fidelity amplifiers or radios. In electronics, the concept of electrical current is often described as similar to a flow of water, while electrical voltage is shown to be similar to water pressure. Fluid amplifiers have made this analogy a reality. In electronic amplifiers, electrons are used to control the flow of other electrons; in fluid amplifiers, thanks to Coanda Effect, air is used to control the flow of air. Fluid amplifiers can be designed to use any kind of fluid, including gases, water, oil or alcohol.

Think of any device that uses air or water, and the chances are that fluid amplifiers will soon replace electrical devices in them. The reasons for this are many. The fluid amplifier can be made smaller. It can operate over wide temperature ranges. It can operate for a long time because the only moving parts are molecules of liquid or gas, and it can operate at lower cost.

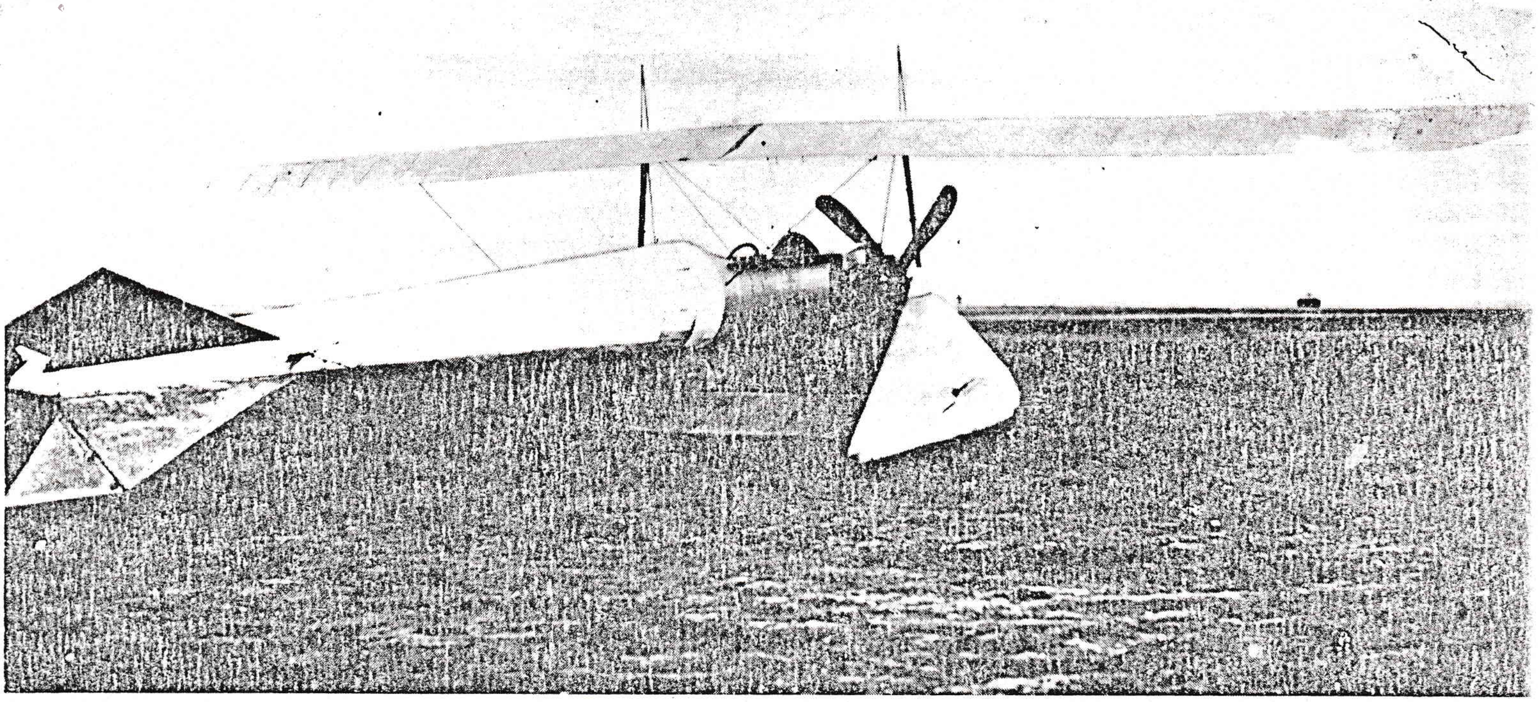
Henri Coanda has spent nearly 35 years applying his Effect to such devices as agricultural sprayers, fog generators, pumps, blowers, engine silencers, separators, marine propulsion systems, atomizers, carburetors, jet thrust reversers, high-lift devices for aircraft, jet engines and vertical takeoff and landing (VTOL) aircraft. He holds U.S. and foreign patents on all of these applications.

In 1935, he designed the first flying saucer. Coanda Effect can be used to create vertical lift without forward motion. He not only used Coanda Effect to provide lift, but also to control the craft. The Coanda Lenticular Aerodyne has never been built because Coanda has never had the money to do it. However, it is a feasible device. Actual tests on the critical portions of it have been made in France, and the results have indicated that it is practical.

However, Henri Coanda has not restricted his inventive abilities to mechanical gadgets alone. Back in 1914, he became interested in biology, and his ever-inquiring mind led him to conduct some of the first experiments in biological engineering. While measuring the build-up of static electrical charges on aircraft in flight (the static discharge "tails" on the wings of jet aircraft are there because of Henri Coanda), he also discovered that plants have an electrical charge opposite to the ground on which they are growing. Later, he measured the "heartbeat" of plants, the waves of pressure that sends sap upward in the stems and trunks of growing things. To improve the yield of his château gardens near Auxance, he built an "artificial cow" that produced fertilizer free of toxins and ready for immediate use. Then he developed a truly organic fertilizer, Bio-Edophos.

Coanda has grown tobacco in a district of France where it has never grown before. He has produced plants with gigantic flowers and fruits, all without hybridization. He is one of the first biological engineers.

In 1945 Coanda began to study water problems as civilization's most basic



Coanda's twin, claimed the world's first, had two engines driving a single, four-bladed propeller. Reims, France, 1911.

interests. He soon discovered crystalline water in living cells that was ice at 98 degrees F. and which melted at about 106 degrees F. He studied snowflakes and identified 10 different types or "molecular isotopes" of water in snow crystals alone. Soon, he was building devices for desalting sea water.

The prowling mind of Henri Coanda has recently become interested in the problems of handicapped people. He feels it may be possible to restore sight to the blind or hearing to the deaf by utilizing other nerve pathways to the brain.

At the age of 80, Dr. Henri Coanda is still inventing and is a healthy and active man. His trained and experienced mind grasps problems in a unique way. He anticipates the needs of society. He comes up with unexpected answers because he tackles a problem with no preconceived notions of how to solve it. The inevitable question arises: why have we not heard of him? In this age of rapid progress in technology, why hasn't his work been snapped up at once? The answer is simple: Henri Coanda prefers to work alone.

In today's world of research and development teams, who will listen to a lone inventor?

People are listening to him now.

"It is the means which create the need," he states. "Before the telephone was invented, nobody needed it. Now, nobody can do without it. Before the automobile was invented, nobody wanted it; now, nobody can do without it."

We'll be hearing more in the future from the most inventive man alive. ✢

The author has an extensive background in science and aerospace technology. As an assistant director of research for a U.S. firm, he worked as a colleague with Dr. Coanda for several years in the 1960s.

The Coanda jet put out 484 pounds of thrust. It crashed on its maiden flight, from Coanda's inexperience at piloting.