

A kelp harvesting machine docking with a full load

Industrial Preparedness for Peace

Obtaining Potash from Kelp

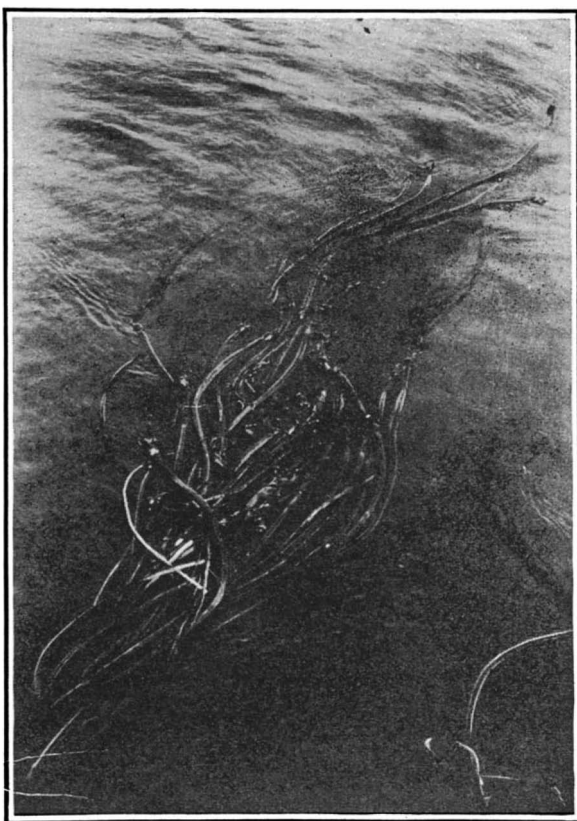
By Monroe Woolley

EVER since the outbreak of hostilities in Europe the newspapers and magazines of this country have been replete with articles bewailing the demoralization caused in various American industries by the cutting off of the German potash supply, and speculating as to the possibilities of producing this commodity in the United States. Many lines of business are affected, but none to such an extent or with so great publicity as that of the growing of crops. The most superficial reader must have had his attention drawn to the fact that K_2CO_3 , KCl and KOH form the basis of fertilizing agents which are vital to the pursuit of agriculture on a scale of any magnitude; that for years the American farmer has been dependent upon Germany for his supply of these compounds; that the cutting off of this supply by the war has caused serious embarrassment to the consumer, acute famine conditions in the chemical trade, and desperate efforts to develop an American potash industry. Every conceivable source of supply for these invaluable potassium compounds has been canvassed, and wherever raw materials are available either commercial production or experiment looking toward it has sprung up.

The discussion of this vital question is never complete without mention of the occurrence of potassium salts in seaweed. It is well known that large quantities of the compounds of this element are present in the vast beds of kelp floating on the waves of the Pacific, close to our western littoral; that each year the waters of the Pacific coast are producing a crop that, could it but be harvested, would run in value from one hundred to one hundred and fifty millions of dollars, and make us totally independent of all external sources of supply. A dozen companies are accordingly now engaged in the campaign to wrest from Mother Nature her secret of how to extract the potash profitably from this oceanic vegetation, and make it available for use in agriculture and the arts.

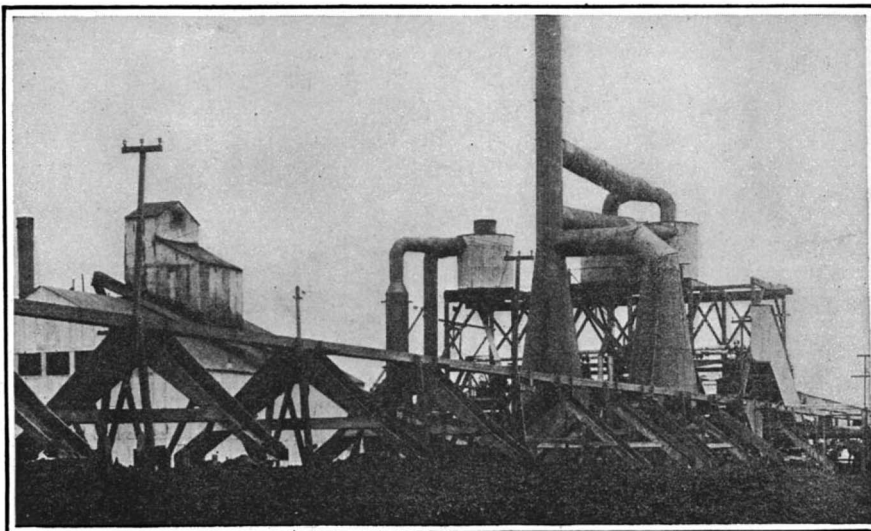
Although there are several plants in operation or under construction in the northwest—at Seattle, for instance—the greater part of the Pacific coast kelp beds lies along the shore of southern California between San Diego and Santa Barbara, and the percentage of potassium at present available in this locality far exceeds that given up by the kelp from farther up the coast. The thriving city of Long Beach is becoming the headquarters for the infant industry in this region. Los Angeles and San Diego are also interested in the work.

Little or no exact information is to be had as to the actual processes employed and the present status of potash extraction. Perhaps the secrets of no new industry were ever more carefully guarded. If the Germans have been mute about their aniline dye processes, the Americans engaged in the manufacture of kelp potash have been painfully so. Of



Growing kelp afloat in the Pacific

course, there are government publications on the subject; but even these cannot be comprehensive when those who are financially interested in the subject treated refuse to divulge what they have learned.



Plant for chemical treatment of the kelp, with dump-pile in foreground

The reason for this attitude is a simple one. The companies which have entered this field have been obliged to undergo a heavy initial expense for experimental and research work in the development of their methods, and are naturally anxious to conserve for themselves the benefit of these expenditures. But it may be stated without reserve that processes have been found for extracting from kelp, on a commercial scale and at a good profit, the potassium and incidentally the iodine which it contains. The mere fact that in certain sections of California the plants are running night and day, that old concerns are enlarging their facilities and new ones fast entering the field, clearly demonstrates at least this much.

The idea of the utilization of the valuable materials locked up in kelp did not have its inception with the war and the war-famine. Years ago, the pioneers of western settlements learned from the natives of Alaska and our own Pacific coast how to fertilize their gardens with kelp from the sea. How these primitive agriculturists discovered that the seaweed is a fertilizing agent we cannot say. Their methods, though crude and uneconomical, were productive of results in their simple farming. They merely dragged the drift weed up from the beach and left it to rot on the spot it was desired to enrich. Western truck gardeners have at times adopted this method of fertilization.

Government experts who have looked into the matter with care, traveling on specially chartered boats from southernmost California waters well into Alaska, have made it clear that not all species of kelp are available for profitable potash recovery. The varieties best adapted to the work are those known as nereocystis and macrocystis. Beds of these aggregating 400 square miles in area have been located off the Pacific coast. This means something like 60,000,000 tons of raw material which, according to the government report, would work down into no more than 2,500,000 tons of potassium chloride. Kelp is 90 per cent water; and of the solid residue, it appears from these figures that something less than half is of value to the seeker for potash.

So far as known there is no kelp-working project under way on our eastern coast, although anyone who has ever spent a summer on the "outside" shore of Cape Cod will easily believe that there is no less seaweed in the Atlantic than in the Pacific. But for some reason the Atlantic species are not so well adapted to harvesting and conversion on a profitable scale. It may be said, however, that investigation here has not been nearly so extensive as in the west, and that in due time profitable fields may be located somewhere along the Atlantic or Gulf coasts.

The stalk of the kelp plant has the
(Concluded on page 226)

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American Aviators with the French Army

(Concluded from page 203)

landing though the machine was completely wrecked. Balsley explains that his machine gun jammed during the second rush of the Germans. He is now in the American Ambulance Hospital in Paris. His wound is not believed to be dangerous, but the doctors say he will never fly again.

Just after these two men had fallen, when things looked bad for the American squadron, reinforcements of French machines came up. The Germans were soon driven back across the lines and the engagement was over. One German machine was destroyed and its two occupants killed and others injured. The French suffered no casualties except the wounding of Balsley and the loss of his machine.

The American aviators are not reckless or foolhardy, but brilliant flyers who use their heads. They continue to be very active despite unfavorable circumstances such as repeated bombardments of their camps and hangars by German aviators. The Germans try constantly to draw out the Americans. At Belfort they sought to get them at a disadvantage, and again just recently in a raid on Bar-le-Duc.

In this latter engagement the Americans ascended as the invading squadron's approach was telephoned from the firing line. They met and opened fire directly over the French hangars at Bar-le-Duc. The Germans again outnumbered them two to one. Both the French captain and Prince were forced to come down, one with a punctured gasoline tank and the other with his ammunition box blown off by explosive bullets. Soon after Cowdin's machine gun choked and he too descended, leaving Hall and Chapman to fight off the Germans alone until reinforced by a French squadron from Toul. They were then able to force the Germans back into German territory and inflict heavy losses though no injuries were suffered on the French side. Several buildings were struck in Bar-le-Duc, and an American ambulance section was kept busy picking up the wounded, most of whom were civilians.

The Americans are equipped with small Nieuport biplanes, called "the Hunter" or "Aeroplane de chasse," which is the fastest machine in the French army and is so small that it is very difficult to handle both in getting away and landing. It is most flexible, however, when in flight, with turning, twisting, dodging and climbing ability far superior to that of the German Fokker used for the same purpose.

The Nieuport is a one-man biplane. The pilot is seated just back of the motor and the planes, with his stationary machine gun on the top plane just in front of him. He operated the gun by means of a release at his side. The gun being stationary, aiming is accomplished by maneuvering the machine into position. The preferred attack is from behind and below the adversary.

Operating these machines is the most difficult phase of aviation. All the responsibility falls on one man, who, to be successful, must possess the greatest skill and courage.

The color of the machine is a mottled green and brown irregularly striped with black. From above these colors blend into the landscape and are practically undiscernible.

The Americans say their duties are comparatively simple. They are to keep the German airmen from crossing the French line. Whenever and wherever they meet a Fokker or an Aviatik they are to bring him down or force him to turn back. If they can do this without sacrificing their own lives or machines so much the better. But it must be done.

Among those who have been most successful is Lieutenant Thaw. He has fought sixteen battles and brought down five adversaries. His machine received several bullets while over the German lines at Verdun, one of which hit him in the elbow, breaking a small bone. He

has recovered and is again with the Corps.

Sergeant Kiffin Rockwell destroyed a German plane on May 18th, and attacked several on May 26th, when he was badly wounded in the face. He brought down two German machines during a battle at Verdun.

Sergeant Bert Hall, after a long, hard fight on May 22nd, brought down a German from a height of thirteen thousand feet. He followed it down three thousand feet and saw it crash to the ground just within the German lines.

Perfecting a Fire-Proofing Solution

(Concluded from page 212)

ammonia, and when made with pure chemicals is colorless. Otherwise it has a yellowish tinge. The exact chemical composition will not be revealed until the patent has been granted and the preparation has been put on the market.

Materials, of course, are not entirely unaffected by fire. They are charred somewhat, but the texture remains. The value of the preparation lies in the fact that treated materials cannot be made to burst into a flame; hence they cannot carry combustion. Even when soaked in alcohol, ether, or gasoline, the combustion ends when these highly inflammable liquids have burned out of the wood or paper.

The substance is also a preservative. The insoluble mineral residue renders materials more durable, and in many cases doubles their wearing power. There are approximately 900,000,000 railroad ties in use in the United States. They have to be renewed once in every nine years—about 100,000,000 being replaced every year. If treated with this liquid, say the inventors, it is reasonable to suppose they may be made to last twice as long.


The commercial possibilities of this discovery are far reaching and unmeasured. All kinds of building materials can be protected; pine shingles will be as safe as slate. It is estimated that 90 per cent of the fires in ordinary dwelling houses start in the roof, and men interested in the manufacture of shingles have written many letters to the inventors. The manager of one of the largest circus companies in the country offered the inventor \$10,000 for the treating of his tents alone. Manufacturers, lumber men, circus and theatrical managers and promoters have deluged the three Iowa men with offers. An important use will be the protection of fibre shipping boxes, to judge from the offers received from the manufacturers of this commodity. Curtains, carpets, rugs and wall-paper can no longer spread a blaze started with the lighted cigarette in the waste-paper basket or the overturned lamp. Public buildings—theaters, hotels, hospitals, schools and factories—may be practically rendered immune from the ravages of fire.

And all this at a nominal cost. It is safe to assert that the price of the preparation will be negligible, compared to the saving of life and property that will result.

Industrial Preparedness for Peace

(Continued from page 214)

shape and appearance of an overgrown blacksnake whip, and from the bulbous end long streamer-like leaves float idly in the water. The roots cling to rocks on the sea bottom, anchoring the plant against wind and wave. A fully matured kelp plant is about 300 feet in length, and requires about 70 days to attain this state. Not only is the growth very rapid, as this would indicate, but the plant is hardy to the point of indestructibility. An investigator at the Puget Sound Marine Station, after noting that mutilation of the blades interfered in no wise with their growth, went on to ascertain just what could be done to the plant without fatal results. She found that small pieces of the blade continued to grow when tacked to a submerged raft, and that pieces little more than one millimeter square, when submerged in canvas bags, more than doubled their lengths in ten days. She also made it clear that the plant grows twice as



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fast in the daytime as it does at night.

In spite of this rapid and persistent growth, the Federal government has deemed it wise to take control of the kelp beds to insure that the plant is merely cut, and not removed bodily from the water. The weed is harvested frequently, and usually to a depth of from one to three fathoms (6 to 18 feet). This operation is accomplished from scows by big steam-driven harvesters which work much like a reaper in a field or a steam shovel in a ditch. One such harvester is now in operation possessing a capacity of a hundred tons per hour. Gathered in this way, the kelp costs from 20 to 40 cents per ton, delivered at the dock.

The expense of converting the raw wet kelp into potash varies with the character of the plant and its equipment. At the present moment this item is a matter of complete indifference to those engaged in the industry; with potash selling at \$600 a ton as against a normal time-of-peace quotation of \$35, the manufacturer need not be at all concerned about his cost of production, or the complete utilization of his raw material. A Freshman in a decently equipped college laboratory could produce potash at a profit under such conditions.

But these conditions, while they may endure for an indefinite period, will not be permanent. In spite of all appearances, the war will end. In spite of all talk about blacklists and trade rings, Germany's natural resources will once more be at the world's disposal.

And what then? We have the raw material. The problem confronting our manufacturers, the problem which, under penalty of dismantling their plants and going out of business, they must solve before the end of the war, is that of getting manufacturing costs down to a point at which the American product can compete with the foreign. In the potash business as in few others, the American manufacturer has a golden opportunity to use the present halcyon days in anticipation of the keen competition and era of profit-shaving and cost-shaving to come.

There will probably be found a solution of the problem—there may have been found a solution already, in fact. Perhaps the plant that will best meet the demands of low-cost production will be a portable, floating one—one which can seek the richest kelp beds, harvest and work up the crop on the spot, eliminate waste by converting the stalks into some form of marketable fiber, and carry the finished products to the nearest market. If we can have floating salmon canneries, why not floating potash factories? Indeed, a plant of this character is reported to be in operation from Seattle now, but the alleged owners refuse to comment upon the rumor, and no photographic evidence is forthcoming.

It is of more than passing interest to note that kelp is the fundamental source of the potash we have been importing. The German potash fields were once seas. Drained by volcanic activity, they were converted into vast stretches of dry land covered deep with stranded seaweed, which presumably was in the same ratio of size to the present-day kelp as all vegetation of the early periods to that of to-day. The earth's heat reduced this to ash, and left Germany this rich natural resource.

American Trade Marks and Patents in Peru

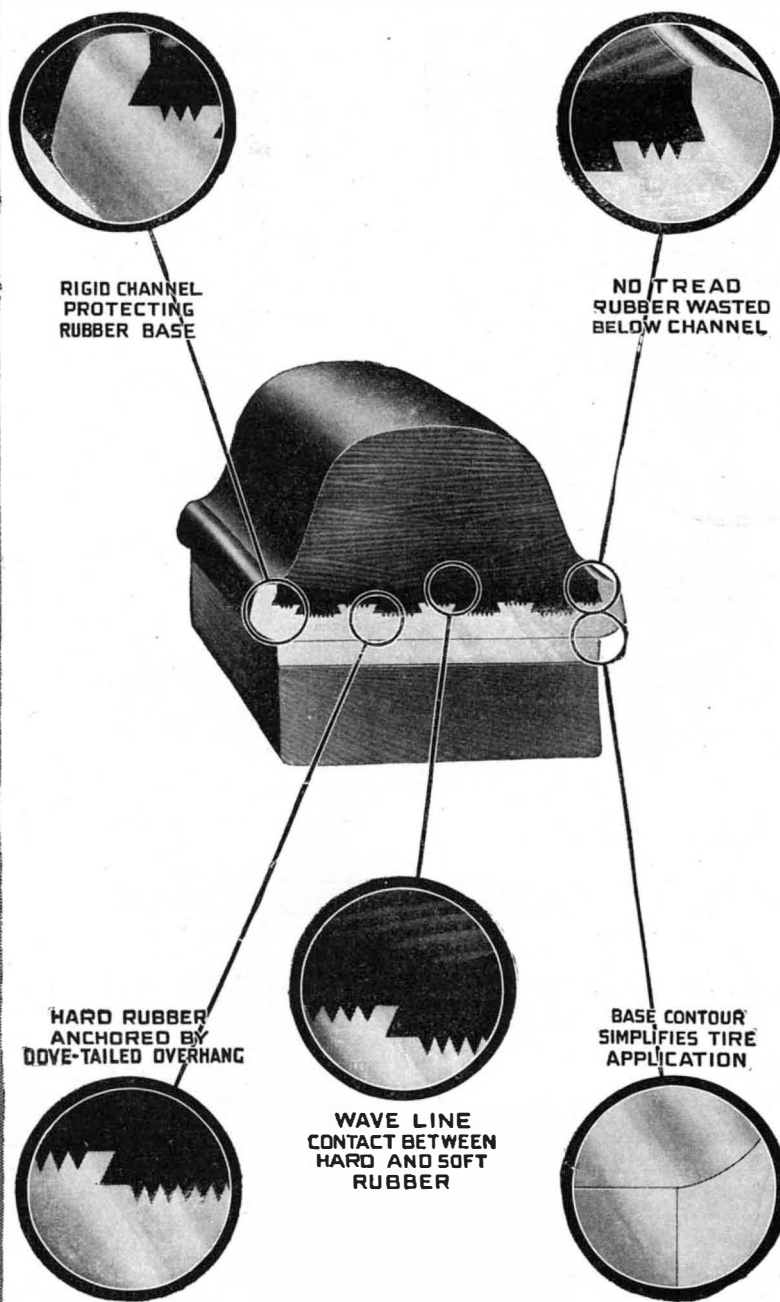
ACCORDING to a report made by the Ministerio de Fomento to the Peruvian Congress in August, 1915, the number of trade-marks registered for the year 1914-15 was 286, as against 406 for the year 1913-14.

Notwithstanding this decrease, the number of marks emanating from the United States increased not less than 50 per cent.

The number of patents granted during the year was 95, a record number, as against 51 for the preceding year. More than 40 per cent of these were for improvements invented in the United States.

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The Autoped—A Compromise Between Skates and Motorcycle

OF late there has appeared on the streets of American cities a queer little vehicle which is neither a motorcycle nor motor skates. In anything, it is perhaps a compromise between skates and the motorcycle, and it would seem that the idea for this unique vehicle has been suggested by the "scooters" made by the youngsters from a soap-box, a few pieces of board, and a discarded pair of roller skates.

The new means of transportation is known as the autoped, and is propelled by a small, single-cylinder gasoline engine. It can attain a speed of 25 miles per hour on a level road. The control mechanism is centered in the handle, which is also used for steering. The autoped is distinctly up-to-date, for it is equipped with a self-starter for the engine.

Because of the small diameter of the wheels fitted to the autoped, it is obviously a vehicle for city streets and smooth highways. Its moderate first cost and low operating expenses should bring it within the reach of practically everyone.

A New American Aeroplane in which Exposed Wires are Entirely Eliminated

MUCH attention attaches itself at the present moment to the speedy scout machine that has been designed by Glenn H. Curtiss, and recently tried out at the Curtiss Aviation Field at Buffalo, N. Y. Piloted by Victor Carlstrom, the machine attained a speed of 119 miles per hour over a surveyed mile course, which is claimed to be the fastest yet made with a motor of 100 horsepower, therefore establishing a new world's record for such a power plant.

The new aeroplane has many refinements and several novel features, but the principal innovation is to be found in the elimination of exposed wires. Aeronautical constructors have long appreciated the detrimental effect of a mass of exposed guy wires on the speed of an aeroplane. In their efforts to eliminate guy wires they have substituted wooden posts, but the gain in speed has failed to meet expectations. Oval or "stream-line" wires have also been used in place of round wires, but still the speed of the machines has been greatly retarded by the network of wires. Hence the only ideal solution of the problem has been to eliminate the wires entirely without substituting a large number of wooden posts, which is precisely what Mr. Curtiss has done. His latest machine has only two posts, one on each side, and not a single wire is used in the trussing. The machine is a biplane with a 20-foot spread, and is equipped with a 100-horse-power, eight-cylinder engine driving a tractor screw.



The autoped, a gasoline-driven vehicle which is a compromise between motor skates and motorcycle

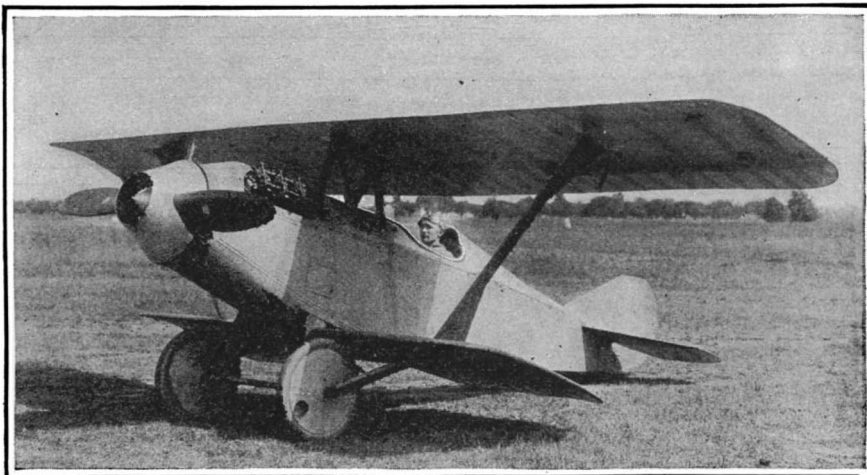
Some slight "cleaning-up" changes are planned in the design of the new machine, which will undoubtedly give it a speed of not less than 125 miles per hour. It is reported that the machine is handled excellently and is of remarkable stability. It is not purely a speed type, but has a sufficient supporting area to make it useful in general, fast military work, and because of its ample wing spread it possesses exceptional climbing

virulent type had formerly been a constant feature, but, within 12 months of the planting of the Blue Gums the disease entirely disappeared, and is now unknown.

What is the explanation of this circumstance? It has been demonstrated that, of nearly all trees, the Eucalyptus absorbs the greatest amount of water. Two seedlings—a Blue Gum and a Plum—are shown in the accompanying illustrations. These were placed with their roots in water and the height of the water was carefully marked. The plants were kept in a warm atmosphere and examined at the end of 24 hours. The little Eucalyptus had disposed of four times the water that the Plum had been able to take up. Seeing that Blue Gums increase in height with great rapidity, often growing many inches a day in a hot position, the amount of moisture taken up increases on a greatly progressive scale. And this is just what brings about the downfall of the malarial mosquito. To complete its life cycle it is necessary that this insect should pass its larval stage in pools of water. With the coming of the Eucalypti these pools and indeed all marshy places disappear; the breeding spots of the mosquitos are gone and in time the insects vanish altogether. The district is

then free from malarial trouble simply because the carriers of the disease are not able to keep going.

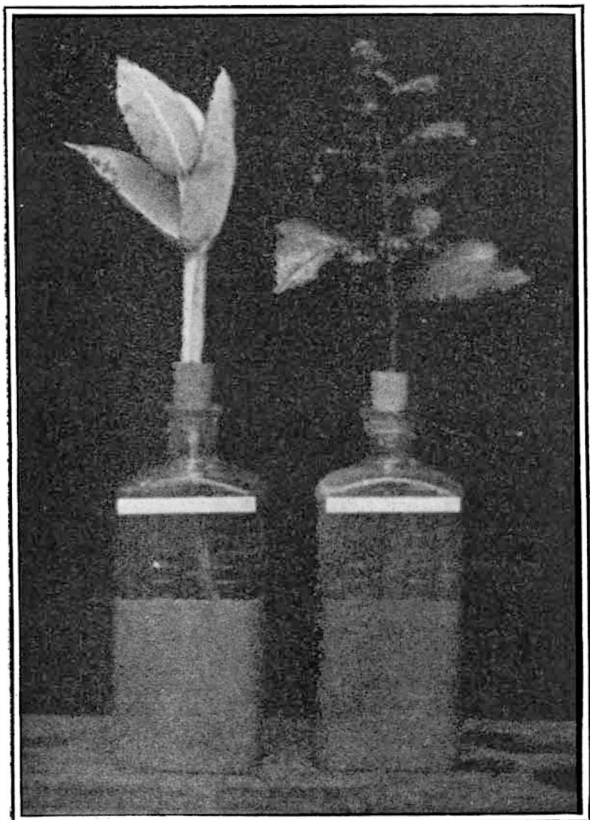
The suggestion carried in the foregoing paragraphs might well be used in districts infested with malarial mosquitos, provided the climate is suited to the Blue Gums or Eucalyptus trees.



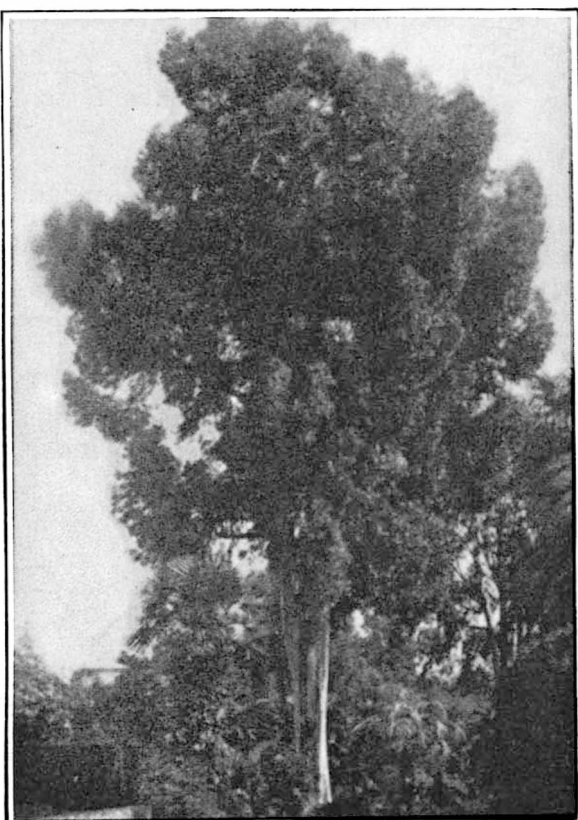
Aeroplane designed by Glenn H. Curtiss, in which exposed guy wires have been entirely eliminated

ability. The machine is said to be the first in which the head resistance as a whole has been reduced to such a great extent.

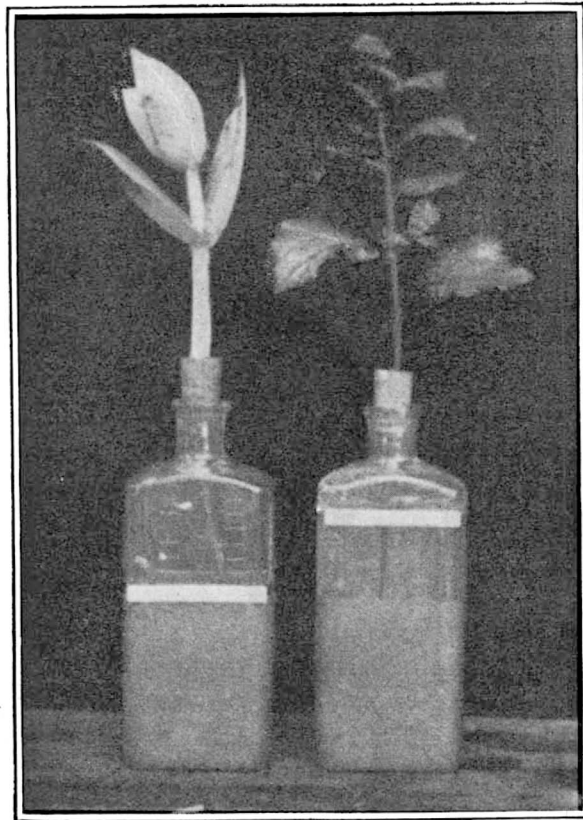
To those who have followed the progress of aviation it would appear that history is repeating itself. Several years ago the Nieuport machine established a new era in aeronautical construction—the streamline.



Blue Gum (left) and Plum (right) seedlings. White line marks water level



Eucalyptus tree thirty years old. (Note man at right.)



Twenty-four hours later. Blue Gum has absorbed several times as much water