

A New Aeroplane Passenger-carrying Record

Louis Breguet's Feat of Transporting 11 People 3 Miles Across Country. Description of the Machine

SCARCELY a month elapsed ere the wonderful record of Le Martin, in his Blériot monoplane, in which he carried nine passengers, was greatly surpassed by another French pioneer, M. Breguet. On March 23rd, above the aerodrome of La Breyelle, at Douai, M. Breguet made a flight with eleven passengers, or, including himself, with twelve people in his biplane. Rising into the air without any perceptible difficulty, he made a straight-line flight of 5 kilometers (3.1 miles) at a speed of 90 kilometers (55.9 miles) an hour. The weight of the machine complete was 600 kilogrammes (1,322½ pounds), and the live load transported was the same, so that a total weight of 2,645½ pounds was carried through the air at express train speed for a distance of over three miles. The average weight of the passengers carried was 50 kilogrammes (110¼ pounds). We believe that this is the first time on record when the live load carried has equaled the complete weight of the machine.

With this demonstration of the possibility of carrying a dozen or more passengers, there is no doubt but that aeroplane flights with several people for pleasure purposes will come into vogue early this summer. The day after Breguet made his great passenger-carrying flight, Roger Sommer got off the ground in his biplane with twelve passengers, but he succeeded in making little more than a jump.

M. Louis Breguet is one of the foremost French aeroplane experimenters. He has been at work at Douai for a number of years past, and has gradually developed one of the most perfect aeroplanes thus far constructed. Previous to his recent experiments he built a helicopter while working in conjunction with M. Richet in 1907. This machine successfully lifted a total weight of 1,100 pounds.

As for the Breguet biplane, its fine lines and simplicity of construction are the result of patient and diligent study and experiment. From the start this machine has been remarkable for its great lifting power, and the wonderful steadiness with which it makes long glides after the motor has been stopped. Only a year ago, on April 8th, 1910, Breguet carried three passengers in an excellent flight at Douai, and attracted the attention of the entire aviation world. Later, at Rouen, Rheims, and other aviation meets, his biplane, driven by himself or by Bathiat, won many prizes for passenger carrying, and showed itself to be extremely speedy and reliable. During the French army maneuvers Breguet carried Captain Madiot and made some excellent reconnoitering flights. On September 1st last Breguet carried four passengers, making a total live load of 750 pounds. Only a few weeks later he carried five passengers and made an excellent flight, the total live load being 860 pounds. These performances of passenger carrying were unequaled until early in the present year, when they were beaten by Sommer and Blériot. On December 31st, 1910, Breguet, while competing for the Michelin Cup, made a flight of 205 miles at high speed.

M. Breguet is one of the French constructors who favor steel tubing in place of wood. The front end of the body of the Breguet biplane is square in cross section, the four corners consisting of four seamless steel tubes, threaded at their front ends. The two lower tubes extend forward and pass through lugs at the front as well as at the rear of the R.E.P. motor. The upper tubes of the body pass through lugs at the rear upper part of the motor crank case. This simple method of attaching the motor securely to the machine is excellent, because it distributes the pull of the propeller throughout the entire body framework. The body is covered with aluminium at the front and with cloth at the rear. There are two vertical struts connecting the upper and lower planes in the center of the machine, and about one-third of the way back from the front edge of the planes. Inclined braces of steel tubing extend upward from the bases of these struts to the front end of the body, and other inclined struts extend forward over the motor and are connected by guys to the upper surface and to the chassis below the lower one, as shown in the diagram above the photograph of the biplane in flight. The planes of the biplane are built up upon steel tube longitudinals located about one-third of the way back from the

front edge. U-shaped ribs of sheet aluminium are fastened to these by an ingenious elastic joint. In the case of the lower plane (which is in two halves), a connecting tube passes through these tubes and is securely fastened to them. Mounted upon this connecting tube is a lever which can be moved by adjusting nuts on a bolt extending from the end of the lever through a short tube that projects from one of the two vertical struts above mentioned. By adjusting this lever the wings can be set at a suitable angle. In a recent following-plane biplane, brought

out by Breguet, he has arranged for the adjustment of the angle of incidence of the planes while in flight—an adjustment that was first brought out by M. Pelterie on his monoplane.

The sketch below the photograph of the machine in flight shows the mounting of a vertical strut of the Breguet biplane. As can be seen, the strut is pivoted upon the cross pin of a sort of stirrup, so that it is capable of a slight movement back and forth. The double guys for bracing the planes are shown in this illustration. One of the main points of the Breguet biplane, however, is the use of steel rods in place of guy wires. In addition to the two vertical struts at the center of the machine, there are but two other struts, one near each end, as can be seen in the photograph. The use of so few struts and guys, as well as the adjustability of the planes, make this machine one of the speediest biplanes in existence. In addition to this, it holds the record for weight carrying, as detailed above. The section of the planes is an even curve having a thick, blunt front edge and narrowing to a fine edge at the rear. The upper plane is longer than the lower one, its spread being 43½ feet, as against 32½ of the lower

plane. The width of the planes is 5½ feet, and the total supporting surface 409 square feet. The main feature of the Breguet biplane is the cruciform tail which is flexibly mounted at the end of the body in such a way that if it is hit beneath by a gust of wind it will give upward and tend to steer the machine in that direction, thus counteracting the tendency to dive that the machine would have if the tail were rigidly mounted. In this manner a considerable degree of automatic stability in a fore-and-aft direction is obtained. The transverse stability of the machine is maintained by warping the wings in the usual manner. The motors used by Breguet have been the Gnome, Renault, or R. E. P. One of the sketches shows the front end of the machine with an R. E. P. motor fitted. The

military Breguet biplane, on account of its steel-tube construction, can be taken apart and packed for transport in half an hour.

For further particulars about the Breguet biplane we refer our readers to our new book on "Monoplanes and Biplanes," which has been specially written by Mr. Grover Cleveland Loening, M. A., and which will be off the press in two weeks' time.

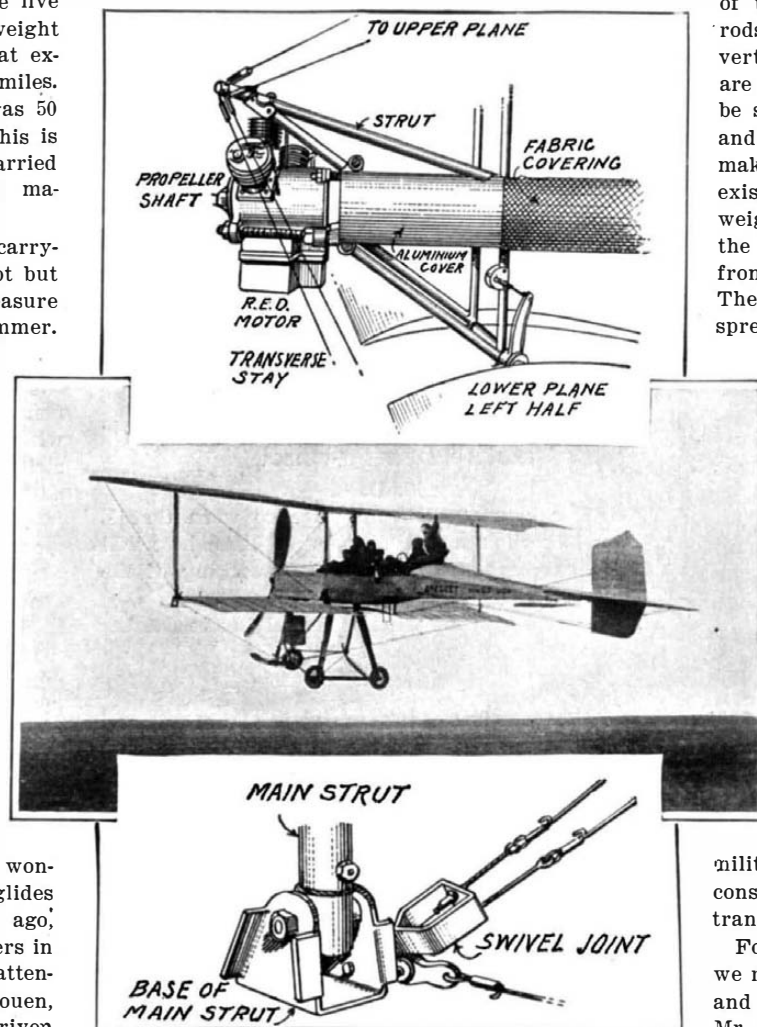
The Gordon Bennett International Aviation Trophy

By Earle L. Ovington, Licensed Aviator

IF the French do not carry off the banner this year in the world's greatest aviation contest it will not be because they are not making elaborate and carefully planned preparations to do so. They have never quite recovered from the shock of surprise given them by Glenn Curtiss when he, an American aviator flying a machine of his own construction, invaded their midst and won the big event at the first international aviation meet, held at Rheims in 1909. On this occasion Curtiss, up to that time practically unknown abroad, surprised the aeronautical experts by beating the fast French monoplanes with a biplane. By winning the Gordon Bennett trophy in 1909, Curtiss brought the 1910 contest to America, and the race took place at Belmont Park last November. Again a surprise awaited the French, for in this case C. Grahame-White, an English aviator, proved the winner. To be sure, the French led until the last lap; but an unfortunate accident prevented Leblanc, their champion, from finishing a race in which he was leading. The French had one satisfaction, however, for Grahame-White used a French Blériot monoplane, although being himself a member of the English team, the trophy went to England. Consequently, on English soil—or, more correctly, over English soil—the contest will be fought this year, the date set being July 1st.

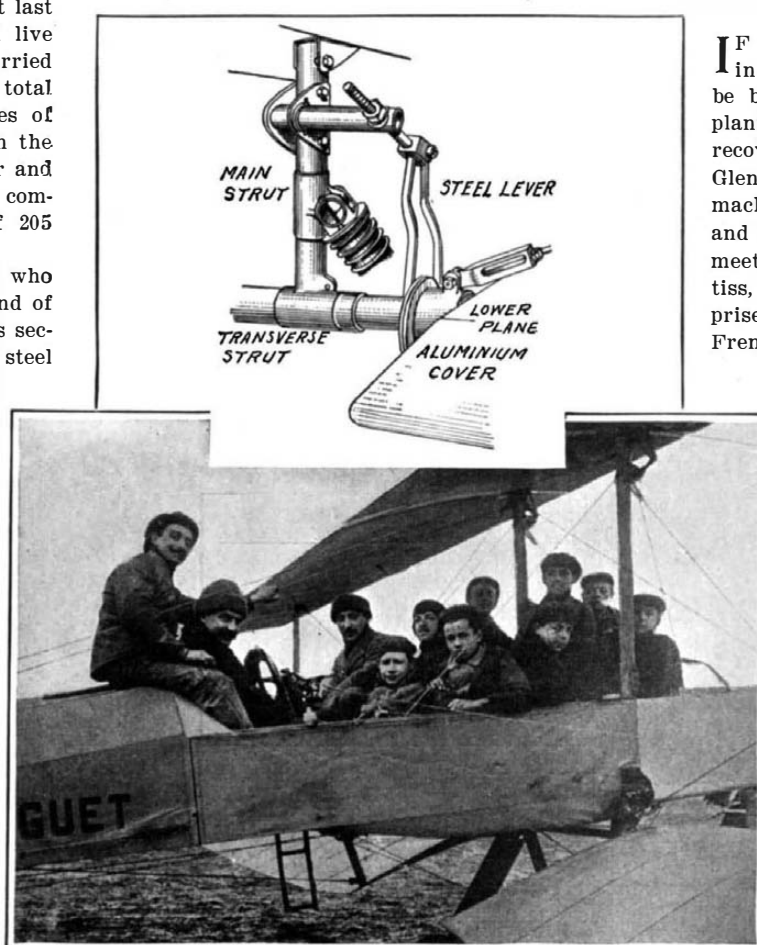
This double defeat has acted as a spur upon the French aeroplane makers, and great is the activity among them to produce racing machines, in the hope of bringing back to France the much-coveted and twice-lost Gordon Bennett trophy. A brief consideration of the most promising aeroplanes which are being built for the French

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The biplane in flight, fully loaded.

The live load equalled the weight of the biplane, each being 1,322½ pounds. The sketches show the mounting of the motor and of the end struts connecting the planes.



Breguet at the wheel of his biplane, showing 10 passengers.

The eleventh passenger, a boy, is hidden from view in the photograph. Sketch above shows arrangement for adjusting angle of incidence of the lower planes.

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so to speak, in the face of a storm of rapid-fire projectiles, until within certain striking distance of her quarry. The vessel herewith shown is amply assured of this power of resistance, because her waterline and broadside throughout the greater part of her midship length are shielded by armor plate ranging from six to twelve inches in thickness, while the waterline region forward and abaft of this area is also covered with protecting armor and cellulose, so as to safeguard the ship against attack which might impair her stability. In addition to this, she has three protective decks and the under-water body is defended by a double bottom, athwartship bulkheads of heavy plating, and also light vertical and horizontal armor plating throughout the region of the torpedo tubes, and the boiler and engine spaces, as indicated in the accompanying diagram. This, in itself, is something of a departure, and is purposely designed to render this vessel less vulnerable to the attack of other torpedo craft.

The proposed ship has the following principal characteristics and general dimensions: Displacement, 15,250 tons; length over all, 492 feet; maximum beam, 75.5 feet; draft, 25.5 feet; motive power, turbines, total capacity 36,000 indicated horse-power; speed, per hour, 24 knots; radius of action, at 18 knots per hour, 2,000 knots.

The armament is to consist of the following elements: Thirty under-water torpedo tubes for the discharge of the long 18-inch Whitehead torpedoes; twenty 4.7-inch quick-firing guns in individual turrets; two 4.7-inch quick-firing guns in casemates, forward on the main deck; ten 2.25-inch quick-firing guns, distributed forward and aft on the bridges.

The ship will carry a supply of sixty automobile torpedoes, and, unlike the deck tubes of the ordinary torpedo boat, these tubes can be reloaded with perfect security while the ship is actually attacking the enemy, if it be necessary. Certainly a ship of this sort opens up a new and fascinating vista in the evolution of the fighting craft.

The Gordon Bennett International Aviation Trophy

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elimination race will no doubt be of interest at this time.

The wonderful French production, the Gnome rotating motor, will undoubtedly be used, to the exclusion of all other makes, by the French team. Whether this motor has the qualities of endurance possessed by the older reciprocating engine is a matter open to discussion; but the performances of the past season have shown pretty conclusively that as a racing motor the Gnome is in a class by itself. It holds all of the world's aviation speed records to-day.

Until this year the 50 horse-power seven-cylinder Gnome motor has been the engine used in what we might call the touring aeroplane, while only a very limited number of the 100 horse-power type have been made, and these were used only for racing purposes. The 100 horse-power motor is practically two 50 horse-power engines in tandem, a common crank case being used.

For the year of 1911 the Gnome Company is turning out, in addition to its former models, a seven-cylinder engine of 70 horse-power and a fourteen-cylinder monster rated at 140 horse-power. The stroke of these new motors remains the same as in the previous models, the extra power being obtained by enlarging the bore. Minor changes have also been made in the structural details, principally with a view of making the motor more readily mountable.

Of the aeroplanes which will compete in the French elimination for the Gordon Bennett race, that of the veteran builder Blériot of course stands out prominently. The new machine, which has been designed and built especially for this contest, is technically called the "Model Twenty," but from its first appearance it has been familiarly referred to as the "Fish Tail" Blériot, because of the resemblance of its tail and rudder to the tail and upper rear fin of a fish.

By far the most interesting feature of the new "Model Twenty" is the use of a flexible trailing edge on the wings, the construction being almost identical with

that used by Henry Fabre in the biplane bearing Paulhan's name.

The entering wedge of the wings is quite different from that formerly employed by Blériot, and, indeed, unlike that of any other machine. Monoplane makers up to the present time have followed pretty closely what is technically called the "Phillips section" in the construction of their wings, as shown in Fig. 1.

Blériot, in his new "fish tail" mono-

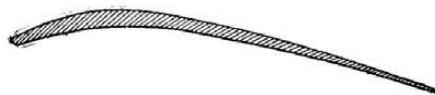


Fig. 1.—Phillips section curve generally used.

plane, has made a radical departure from the orthodox design, the entering wedge having a decided and peculiarly shaped "hump," as shown in Fig. 2, at *a*. This figure also gives an idea of the flexible trailing edge. The entering edge of the wings and that portion up to *b* in Fig. 2 is rigid, except for the slight movement allowed for "warping." From *b* to *c* there are tapering flexible ribs sunk into the rigid portion of the wings, and separated from each other by a distance of about one foot. The whole framework is covered, as is customary, with cloth, the cloth stretched between the flexible ribs giving the wings a bat-like appearance.

The "fuselage," or body of the "Model Twenty" Blériot, is, unlike the former types, entirely inclosed, cloth being tightly laced over a framework similar to, but about half the depth of, the standard



Fig. 2.—Cross-section of new Blériot monoplane wing.

The peculiar blunt shape of the heavy front edge is shown at *A*, and the flexible rear edge from *B* to *C*.

Blériot fuselage. The tail plane and elevator are flat instead of curved, and the rudders are two triangular planes above and below the flat tail plane.

The writer was present at the Blériot school at Pau, France, when the first "Model Twenty" was tested. Driven by a Gnome 50 horse-power motor, it passed the regular model with the same engine at a speed approximately 20 per cent greater. Evidently Blériot himself was pleased with his new design; for the Gordon Bennett racer is the "Model Twenty" fitted with the new 140 horse-power Gnome motor.

Another monoplane which has attracted some attention lately, and will probably be heard from in the French elimination race, is the "Derpedussin," designed by a Frenchman of that name. This machine has some points in common with both the Blériot and Antoinette. The "Derpedussin" first came prominently into the limelight when Busson, a couple of months ago, at Rheims, broke the world's speed records carrying two passengers. One of the 140 horse-power Gnome motors, now being built, is for the "Derpedussin" monoplane intended for the Gordon Bennett elimination.

A machine almost identical with the Blériot in general appearance is the Morane, designed by Leon Morane, a former Blériot pilot of note. The Morane monoplane differs from the Blériot principally in the landing chassis and tail planes. From the above one can see that it should be a factor in the French trials.

Aviation experts were indeed surprised when the little Nieuport monoplane, driven by an opposed double-cylinder motor of only 30 horse-power, practically equalled Leblanc's fastest records established at Belmont Park last November with his Gordon Bennett 100 horse-power Gnome Blériot. A careful examination of the Nieuport shows nothing unusual in wing design which could account for the remarkable speed developed with such a low-power engine; but even a casual glance at the body construction and the miniature and rather impractical-looking landing chassis, does much to explain the mystery. Unquestionably its phenomenal speed is due to the reduction of head resistance. The fuselage

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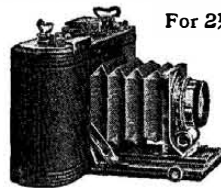
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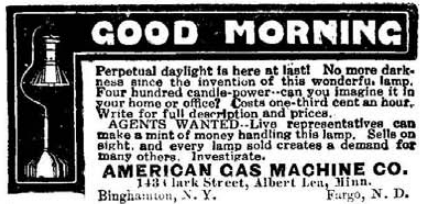
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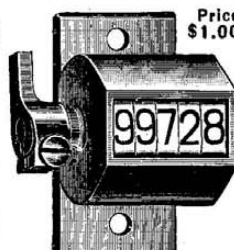
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follows the "stream-line" form more nearly than that of any other machine, being comparatively blunt at the bow and tapering gradually to the tail. It is the opinion of the writer that few designers to-day realize the enormous importance of reducing head resistance in a racing aeroplane, or, for that matter, in any type of *machine à voler*.

In speaking of the racing machines which are likely to figure prominently in the French trials for the Gordon Bennett trophy, one cannot neglect mentioning the Breguet biplane, which holds the world's record for weight lifting. Only a few weeks ago this remarkable machine flew a short distance at Douai, in France, with no less than twelve persons aboard, and also showed truly remarkable speed for a biplane. It is safe to say that, outside of the Wright "Baby Grand," which has been somewhat of a "dark horse," the Breguet is by far the fastest biplane in the world. And in Breguet the world has another designer who appreciates the advantage of keeping down head resistance. In his new biplane most of the wire stays and small struts common to biplanes have been eliminated, and large frame members, of fewer number and having a "stream-line" form, have been substituted. The fuselage, too, is inclosed and of small section, tapering gracefully to the tail planes.

It certainly looks, just now, as if the French will be well-nigh invincible in the Gordon Bennett race. Unquestionably the French lead the world to-day in aviation. French makers are carefully guarding their new models, and will not place them on the market until after the Gordon Bennett contest. Both England and America will have difficulty in choosing a team of three fast machines to carry their respective colors, while the French have a great variety from which to choose. This fact, combined with the fact that the pick of the new 140 horse-power Gnome motors will doubtless be assigned to the French racers, gives the French a decided advantage in the forthcoming contest.

Armored Cars in the Mexican Revolution

(Continued from page 410.)

tected, but the steel apron extends down over the drivers and trucks, back over the sides of the water tank, and up around the smokestack, coming back in a straight line to the cab, so as to protect the domes as well.

The main use of this engine and the armored cars will be to patrol the Mexican Central branch of the National Railways on that division which extends from the border at Juarez (opposite El Paso) to Chihuahua, a piece of railroad which has been in the hands of the rebels for some months. The government believes that, with these cars, it will be able to prevent further dynamiting of bridges and tearing up of tracks by the insurgents, at least along this particular line.

Lakes Tipped by Winds

UNDER the force of great gales, large lakes and tideless seas, like the Caspian, have been observed to experience surprising changes of level, as if they were huge basins of water tipped by the hand of a giant.

In the Caspian a difference of level between the two sides of the sea amounting to twelve feet has been noted during the prevalence of a heavy wind. In Lake Erie a difference of level of fifteen feet has occurred in similar circumstances. Analogous observations have been made on other lakes and in the Baltic Sea.

A Dam of Buttressed Arches.—A form of dam with buttressed arches in place of a gravity mass is outlined in a study in *The Engineer* by Reginald Ryves. The proposed structure has an up-stream face placed at an angle of 45 degrees, and varying in thickness from 17 feet at the base to 6 feet at the crest. The rear face presents a series of arches, turned up stream, with their abutments supported by a series of buttresses, which bed upon the carefully prepared surface of the solid rock. The maximum stress on the arches is 12 tons, and on the buttresses 10 tons per square foot.

Aeronautics

Four Persons in a Record Cross Country Flight.—That the prophecy made on page 407 regarding the immediate use of the aeroplane for cross-country flights with several people, is already being fulfilled, is shown by the record flight on the 14th inst. of Aviator Lanser from Kiewit to Brussels—a distance of 54 miles—with his three sisters.

Aviation at Mineola.—Last week W. Starling Burgess made some flights in a Wright-type biplane of his own construction, at Mineola. He has learned to fly a Wright machine and is manufacturing them under license, as well as Farman-type biplanes, of which he has already made seven for Grahame-White. Mr. Burgess has opened an aviation school at Mineola, and a number of pupils have already been enrolled.

Unsuccessful Test of a Novel Aeroplane.—The first test of the novel dish-shaped aeroplane of W. S. Romme, the model of which showed excellent automatic stability, occurred on April 14th at San Antonio, Texas. Although fitted with a Gnome motor of 50 horse-power, the machine was unable to get off the ground, according to the telegraphic report. It is said to have been rather badly damaged by jolting over the ground. Mr. Harold McCormick, of Chicago, has assisted in the developing of this machine.

A Novel Two-motor Aeroplane.—One of the would-be entrants for the Gould two-motor aeroplane prize is Mr. Julius W. Schubert, a young Austrian of considerable mechanical ability, who has invented and patented a novel biplane and motor with a view to competing. The usual devices for maintaining the transverse balance of the aeroplane are dispensed with in this biplane, two double-surface horizontal rudders—one toward each side and in front—being used instead. The motor is in three units, two of which are run together and made to drive two propellers in front, while the other unit drives a single propeller at the rear. Mr. Schubert would like to hear from anyone willing to help him in the construction of a machine with which to compete for the Gould prize.

Perilous Flight with a Lady Passenger in America.—Frank Coffey, one of the Wright aviators, made a 17-mile flight from Augusta to Aiken, S. C., in 21 minutes on March 30th. He was accompanied by his wife, who was thus the first lady passenger to make a cross-country flight of any considerable distance in the United States. This flight was made in a strong wind. It was an excellent demonstration of the already well-known capabilities of the Wright machine. The speed average was about 50 miles an hour.

An Astonishing Flight from London to Paris.—Not since the late John B. Moisant flew from Paris to London with a passenger has anything so sensational been accomplished in this direction as was the non-stop flight of M. Pierre Prier on Thursday, April 6th. In a Blériot monoplane of 50 horse-power, M. Prier covered the distance of about 250 miles in 236 minutes, or in less than four hours, thus averaging more than 63 miles an hour throughout the entire distance. The start was made from Hendon, near London, at 1:37 P. M., and the finish was at Issy les Moulineaux at 5:33. Both at the start and at the finish the aviator ran into a thick fog and he was obliged to ascend to the height of 3,200 feet in order to get above it. He crossed the Channel at this height, which he kept throughout most of his journey. At Beauvais, about 50 miles from Paris, he entered the fog a second time, after having a clear atmosphere during the intermediate stage of his journey. The monoplane he used is said to be the same Blériot with which Le Blanc won the Circuit de l'Est last summer. The fastest express trains from New York to Boston, which is about the same distance as from London to Paris, require five hours in which to make the journey, so that M. Prier's feat is remarkable not only for the long distance across country and over the Channel in a single flight, but it is also noteworthy on account of the high average speed he maintained. The possibilities of the aeroplane for rapid communication have never been more brilliantly illustrated.

Interesting Books

The Scientific American Boy

By A. RUSSELL BOND, 12 mo., 317 pages, 340 illustrations. Price, \$2.00.

This is a fascinating story of outdoor boy life, and contains a large number of practical suggestions which, in addition to affording amusement, will stimulate in boys the creative spirit. In each instance complete, practical instructions are given for building the various articles. The boy camper is supplied with directions for making tramping outfits, sleeping bags, tents, tree houses, straw huts, log cabins and caves. Winter diversions include instructions for making skate sails, snow shoes, ice boats, scooters, sledges, toboggans, etc. The more instructive subjects covered are surveying, wigwagging, heliographing and bridge building. Miscellaneous devices, such as scows, canoes, land yachts, windmills, water wheels and the like are also described. It is attractively illustrated with half tones from life and numerous diagrams and engravings drawn to scale.

The Scientific American Boy at School

By A. RUSSELL BOND, 12 mo., 338 pages, 314 illustrations. Price, \$2.00.

This is a sequel to "The Scientific American Boy" and like its predecessor is brim full of practical suggestions, all of which are entirely new. The construction of the apparatus, which is within the scope of the average boy, is fully described and the instructions are interwoven in a fascinating story, which makes the book interesting as well as instructive to the boy. This volume contains instructions on surveying, sounding and signaling, the building of dams, canals and canal locks, truss bridges and several different types of boats. Sun dials, clepsydres, seismographs, gliding machines, kite photography and camera hunting are a few of the other interesting subjects taken up. Other unique ideas are water kites, fish-tail boat-propellers, bicycle sleds, geyser fountains, etc. No boy of a mechanical turn of mind can read the story without being inspired to try his hand at making the devices.

Magic, Stage Illusions and Scientific Diversions, Including Trick Photography

Compiled and Edited by ALBERT A. HOPKINS. Large octavo, 556 pages, 400 illustrations. Price, \$2.50.

This work appeals to old and young alike, and is acknowledged by the profession to be the standard work on magic. The illusions are all explained in detail, which show exactly how the tricks are performed. Great attention is paid to the exposures of large and important illusions, which in many cases have been furnished by the prestidigitateurs themselves. Some of the most important tricks of Robert Houdin, Baudier de Kolta, Heller and Hermann are explained. Conjuring tricks have not been neglected, a selection of some of the best of them having been made—fire-eaters, sword-swallowers, ventriloquists, shadowgraphists—all come in for a share of attention, while mental magic, ancient magic, trick photography, automata, curious toys and stage effects are well described and illustrated.

The New Agriculture

By T. BYARD COLLINS, 12 mo., 374 pages, 106 illustrations. Price, \$2.00

This interesting volume is a popular outline of the many changes which are revolutionizing the methods of farming and the habits of farm life. It deals with the subject in a scientific way and form a new viewpoint. The author has devoted his lifetime to the study of changing economic agricultural conditions. Irrigation, the new fertilization, the new transportation, the new creations, the new machinery, all come in for a share of attention. The illustrations are of special value, and are unique. All who are interested in agriculture should obtain a copy of this most timely addition to the literature of agriculture.

The Fourth Dimension Simply Explained

With an Introduction and Editorial Notes by PROF. HENRY P. MANNING. 12 mo., 251 pages, illustrated. Price, \$1.50

A friend of the Scientific American donated a prize of \$500 for the best simply-worded non-mathematical explanation of the fourth dimension. The prize essay, together with the three others, which were accorded honorable mention, were published in the columns of the Scientific American. As a result, so much interest was aroused on the subject of the fourth dimension, that it seemed advisable to collect, in permanent form, the more meritorious of the 245 essays which were sent in from all parts of the world. The present work presents twenty points of view, all of them interesting and no two quite alike. The reading of one essay does not involve the reading of the entire work, yet the entire book gives a comprehensive view of what the layman wishes to know about the fourth dimension.

Any of these books will be sent postpaid on receipt of advertised price.

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