

minutes 44 seconds. Distance in one half hour: 50 kilometers (31 miles). Distance in one hour: 104.141 kilometers (64.6 miles). Greatest speed: 107.462 kilometers (66.6 miles) per hour. Duration: 1 hour 2 minutes 25% seconds. Total distance: 110 kilometers (68.2 miles).

When Garaix established his height record for six passengers with 1,750 meters (6,740 feet) in 27 minutes he employed an angle of incidence of 7 degrees, while in his records of April 22nd, he used an angle of 1½ degree. The practical utility of the apparatus is thus seen at a glance.

The New British "Mark R. E." Biplane

By Major H. Bannerman-Phillips

THE aeroplane known officially as the "Mark R. E." biplane is the product of the Royal Aircraft Factory, Great Britain. At the Wilbur Wright memorial banquet in London on the 19th of May last, Colonel Seely, late Secretary of State for War, referred to this machine when he said, in responding to the toast of "Flying," that in his judgment the problem of stability of the aeroplane had been solved, since on the previous Friday he had taken part in a demonstration in which at the height of 2,000 feet the pilot abandoned all control, and he himself steered the machine about. There was a 28-mile an hour wind blowing when the experiment came off and the machine took the right banking and resumed its level flight. It is a tractor-biplane with four-bladed propeller. The engine used with it is a 120 horse-power Beardmore-Austro-Daimler. The letters "R.E." stand for "Reconnaissance-Experimental," and the machine is considered good even outside of government circles, which in regard to the flying machines of the Royal Aircraft Factory is not always the case. It is a modification of another well-known machine turned out by the Royal Aircraft Factory, the "B.E." or "Blériot-Experimental," of which a number are in use in the British air service. The question of publishing some of the aero-dynamical features of the construction has not been decided at present, but the military features will naturally be kept secret as long as possible, since the public interest demands it. It is, however, inherently stable and does not owe its self-balancing properties to any automatic control machinery. The object of providing for stability is not that it may be easier for an indifferent pilot to manage the machine, but in order that during the ever-increasing length and duration of flights for purposes of military reconnaissance the strain of constant balancing and control may be reduced to the lowest possible limits, and the pilot's energies economized to that extent, while at the same time, if he is required to do double duty as both pilot and observer, through casualty in war-time, he may be able to do so more easily than in a machine which requires greater continuous attention on the part of the pilot.

It may be observed here that the question of automatic or inherent stability is not so important in machines flown at considerable height, since the experiments of Pégoud and the imitation of his feats by others, in addition to sundry involuntary experiences on the part of sane airmen preceding Pégoud's attempts, have shown that, given sufficient room vertically, an aeroplane can be overturned and righted again without coming to earth by the efforts of the pilot. On the other hand, the close attention demanded of the aviator by a purely hand-controlled flying machine which is not inherently stable is very great during a long journey, and he is liable to be taken off his guard by a wind-gust occurring during a comparatively calm voyage, whether over land or sea. At the same time it must be remembered that the self-balancing aeroplane, so called, whether it owes its steadiness or stability to design and construction, as in the Dunne machines, or to automatic control, as when fitted with the Dautre stabilizers, has the defects of its self-righting qualities in that when the pilot does exercise full control, as for instance in turning or landing, it is apt to be sluggish in answering to that control, which under certain circumstances may be awkward and even dangerous. For instance, at maneuvers in Great Britain quite recently an officer of the Royal Flying Corps, who had chosen his landing-place and was coming down, suddenly became aware of a squadron of cavalry, who, in the course of a sham fight, were emerging from cover and charging across the open ground he had selected. By a supreme effort of skill and judgment he managed to avoid them, but one shudders to think of the havoc his machine would have caused if through want of skill on his part or slowness of the aeroplane in answering to the controls, it had been driven in among men and horses.

According to the London *Times* the King, the Queen, and Princess Mary recently paid a visit to the Royal Aircraft Factory and witnessed a flight by the "R.E." The passenger was Major Clive Wigram, Assistant Secretary to the King, who was taken a flight of about 10 minutes without either controls, elevator, or rudder being touched.

Although the manner in which stability is maintained has not yet been made public, the *Times* ventures the following explanation:

"It is believed that in the present instance the rudder is spring-controlled, but that all other movements are due to the inherent stability of the design, which, expressed in other words, is this: A righting couple is formed, tending to restore balance when by any means balance is disturbed, and, in addition to this, if the flight path is disturbed, any oscillation which is set up is of the kind which dwindles down to nothing. If an aeroplane is stable laterally it must also be stable directionally, since the two are inextricably linked, but they may be considered separately to some extent. Any loss of lateral balance involves side-slip, and therefore side-slip is utilized to create the restoring couple. Side-slip produces a side wind on the "fin" surfaces of the aeroplane. These are made up of the lateral surfaces of the struts, wires, wheels, the fuselage, the propeller, and in addition there is a fin equivalent obtained from the dihedral angle between the wings. On all these surfaces the side wind acts, and if they are exactly proportioned there is enough top fin to give the righting moment. So far this has long been known and practised by aeroplane builders, but it does not give the stable aeroplane, as we may see by carrying the analysis a little farther. When the side-slip begins the whole aeroplane moves sideways relatively to the air, consequently the fin forward and the fin aft must be exactly balanced.

"If, as has so frequently been the case in the past, the fin near the rudder is too large, the side wind up it tends to throw the stern round, and, in the absence of the pilot's correcting action on the rudder, the machine "nose-dives." Conversely, with too small a fin aft, the same trouble arises in a different set of circumstances and produces the same awkward results.

"It is precisely in the calculation of the fin aft in relation to the fin forward that the directional stability so closely affects the lateral stability, and this linkage has, it is hoped, been made broadly evident by the above example.

"In longitudinal stability the difficulty is quite different. Longitudinally there are oscillations of the aeroplane on its center of gravity regarded as pivot, and there are oscillations of the whole mass on its path; both classes of oscillations must tend to die out.

"A matter of extreme importance in this connection is the alteration in the lifting force exerted by the wings. Unfortunately, when a dive begins, the center of lift of the wings tends to move backward toward their trailing edge, and this obviously aggravates the dive by lifting up the tail and depriving the front edge of the wings of their quantum of lift.

"To remedy this and to damp out oscillation is the function of the tail. Those machines which depend entirely on the pilot's sense of balance also depend entirely upon him to check the oscillations by appropriate movements of the elevator. Many an argument has taken place between those who, to give the pilot greater control, insisted upon the whole of the tail being mobile, and certain authorities who insisted that the damping effect on oscillations of the fixed portion of the tail was of priceless value to the pilot by giving him time to act. This point of view has to-day obtained far greater force in that the fixed-tail plane, if appropriately designed, can not only damp oscillation, but actually introduce the corrective moment necessary."

Business in the Patent Office

THE issue of patents on July 14th, 1914, appears to be the largest in the history of the Patent Office, and will include 907 mechanical patents and 23 design patents. During the past three months the receipts of the Patent Office have broken the record, the receipts for April, 1914, being \$208,905.64; for May, \$193,723.24; and for June, \$198,508.79; or a total for the quarter of \$601,137.67.

A comparison of the applications received in 1913 and 1914 of the Patent Office shows as follows:

Applications received during the fiscal year ended June 30th.	1913.	1914.
Applications for patents for inventions....	67,986	69,311
Applications for patents for designs.....	1,930	2,441
Applications for reissues of patents.....	172	189
Applications for registration of trade-marks.....	7,053	8,146
Applications for registration of labels...	926	1,016
Applications for registration of prints...	344	436

Disclaimers.....	22	20
Appeals on the merits.....	1,651	1,696

Total applications, disclaimers and appeals.....	80,084	83,225
--	--------	--------

Autographic Kodak

THE latest invention in cameras is the autographic Kodak, the conception of H. J. Gaisman, who also invented the auto-strop razor.

Heretofore, to keep a record of pictures has meant that the films must be marked in some way after they have been finished, or the prints must be marked.

With the autographic kodak the record can be made with one operation immediately after the picture has been taken. The film is marked in the kodak.

The autographic kodak uses what is called the autographic film cartridge. This is made with a thin red instead of the familiar thick red and black (duplex) paper. The thin red paper is not lightproof in itself, but between it and the film is inserted a strip of tissue. This tissue serves two purposes: to supplement the red paper in lightproofing the cartridge, and to permit the recording, by light, of the writing upon the film.

The autographic kodak has a spring door on the back, covering a narrow slot through which the writing

is done upon the red paper. The slot is provided with an automatic safety spring border which operates when the door is open to press the papers into contact with back of the film, thus securing the sharp printing of the image of the writing and preventing the diffusion of light around the edges of the slot. This slot is located so that normally the writing comes between the exposures.

After the picture is taken, the door is opened, and with a stylus which is provided, or a smooth pointed pencil, held in as upright a position as is convenient, the photographer writes on the strip of exposed red paper any memorandum desired, such as the title of the picture, the date, or details regarding exposure, light, stops, etc.

The action of the stylus or pencil so affects the tissue as to permit the light to record the writing upon the film. After finishing the writing, the door should be left open for the printing, in accordance with a table for varying degrees of light. The exposure is made to the sky, but not to the sun.

The result is a negative, bearing a facsimile of the memorandum written upon the back of the red paper, developed on its margin or face as the case may be, the writing appearing in the foreground of a vertical picture or on the left side of a horizontal picture.

Do the Planets Affect Our Weather?

ONE of the correspondents of the Weekly News Letter to Crop Correspondents published by the Department of Agriculture wants to know whether the positions of the planets have any effect on the weather. The following is the News Letter's answer:

A few people strongly assert that they do, while many others have their doubts. Those, however, who have given the subject careful attention are positive that none of the planets, nor even the moon, ever has any appreciable effect on the weather.

As a matter of fact, all weather changes depend ultimately upon temperature differences. The temperature, as we know, constitutes of itself a most important weather factor. Another and equally important weather factor is rainfall. But to obtain rain it is necessary first to evaporate water from the surface of the earth, and this, as everyone knows, requires heat. Still another important weather factor is the direction and force of the wind, and this, too, requires heat, for the winds will not blow unless the temperature is different at one place from what it is at another, any more than the air will draw up a chimney when there is no fire in it.

Since then the heating of different parts of the earth and its atmosphere to different temperatures is the real cause of the winds and of all weather changes it follows that the moon and the planets can affect the weather only so far as they supply heat.

Now, according to accurate measurements made with the most delicate instruments, the amount of heat sent to the earth by all the planets and also by the moon is insignificant in comparison to the amount that comes from the sun. Hence, we could not expect either the planets or the moon appreciably to affect the weather. They do not supply enough heat, the one thing that causes all our weather changes.

To most people the foregoing reasoning may seem quite sufficient and conclusive, but there is still another and an entirely different method of testing the whole question. We can observe the positions of the planets and the kind of weather during each position and see whether the same sort of weather always comes when the planets are in the same position. This kind of examination has often been made, both for the planets and for the moon, but not the slightest influence of either upon our weather has ever been found.

To sum up: We have every reason to believe that neither the planets nor the moon can have any appreciable effect on the weather, because they furnish so little heat upon which all weather changes ultimately depend, and this belief is fully supported by weather records.

The belief, still to be found in all countries, that the planets and the moon do affect the weather never had any scientific basis whatever; it is only a remnant of the many superstitions generated and fostered by that other and greater superstition, astrology.

The Wireless Outfit of the "Imperator" comprises three separate stations; one of 15 kilowatts, for long-distance work; one of 3 kilowatts, mainly for communicating with vessels at moderate distances; and an emergency station worked by a powerful storage battery. The main station can exchange signals directly with the large land stations of America or Europe during the whole of the transatlantic voyage, so that the delays involved in relaying messages from ship to ship are avoided. In midocean the ship is in communication with both the German station at Norddeich and the American station at Sayville. The emergency station, intended for use in case of a stoppage of the ship's dynamos, is capable of operating for six hours.