sions will be made by a special committee, who will decide how much of the proceedings shall be printed, and will edit the same. Decided preference will be given to those papers stating the results of actual experiment, or presenting rigorous mathematical proof, because facts and positive knowledge are deemed more instructive than projects or vague theories.

A reception and luncheon will be given to the members of the Congress immediately after the morning session on Monday, October 28.

Cards of admission to the Congress will be issued in advance by the Secretary of the Committee upon application to him, approval by the Committee, and the payment of a contribution of $3·00 to the publication fund. These cards will entitle the holder to attend the Congress and to receive all its subsequent publications.

All communications should be addressed to Ernest La Rue Jones, Secretary of Committees, 12 East 42nd Street, New York City.

Letter to the Editor.

THE METEOROLOGICAL CONDITIONS ABOVE ST. LOUIS.

To the Editor of the "Aëronautical Journal."

SIR,—In your April number you quote from the Aëronautical Map issued by the Aëro Club of St. Louis concerning the probable drift of the balloons which will start from that place next October in competition for the Gordon-Bennett Cup. Permit me first to point out that the length of a balloon voyage is to be reckoned in a straight line from the starting point to the place of landing, and therefore the distance accomplished by John Wise, who travelled from St. Louis to Henderson, New York, in 1859 was only about 970 miles, instead of the 1150 miles stated. The map also gives the tracks followed by some of the *ballons-sonde* which have been dispatched from St. Louis by Messrs. Clayton and Fergusson of this Observatory since 1904, but since less than half of the balloons returned to us figure on the chart, and since, moreover, no indication is given of the heights reached by these balloons, it seems worth while to furnish some details of the experiments, in view of their bearing on the probable course and speed of the racing balloons next autumn.

The balloons used in my experiments were the rubber balloons of Professor Dr. Assmann, which are well known in Europe, and were filled with hydrogen gas. Each carried a self-recording barometer and thermometer, constructed on Teisserenc de Bort's system, which a parachute, covering the upper portion of the balloon, brought safely to the ground after the balloon had burst on reaching the maximum height commensurate with its expansion. We sent up 56 of these balloons during the years 1904, 1905, and 1906, and, by remarkable good fortune, 53 balloons with their instruments were found and returned to this Observatory, on payment of a small reward to the finders. The records of barometric pressure and temperature were usually decipherable, and from the automatically-recorded times of the ascent of the balloon at St. Louis and its descent at a place, whose distance and direction from St. Louis are known, the average direction and velocity of its drift can be calculated.

Classifying according to altitude all the ascensions at different seasons of the year, I have obtained the figures for the movement of the air at different heights above St. Louis which are embodied in the accompanying table. No. 1 embraces the balloons whose maximum height was less than 18,000 ft.; No. 2 those in which the maximum height was between 16,000 and 33,000 feet; No. 3 those between 33,000 and 49,000 feet; and No. 4 those greater than 49,000 feet.

It will be seen that the velocity, and consequently the distance travelled, increases up to the third level, above which there is a slight decrease in velocity, and that the lowest balloons took the most southerly course (S. 79° E.), while the level 2 balloons went nearly due east (S. 87° E.). Naturally, there were great individual differences in velocity and direction. Thus, in level 1, which will hardly be exceeded by the manned balloons next October, one *ballon-sonde*, which reached a height of 7600 feet on Nov. 23, 1904, travelled 55 miles at an average velocity of 51 miles an hour, while the next day another balloon at a slightly greater altitude followed the same course but went 90 miles further. The minimum velocity was shown by a balloon on May 17, 1906, which, though it rose to a height of 14,700 feet, travelled only 15 miles north-east at an average speed of but 11 miles an hour. It appears probable, however, that the balloons which compete in the internationl cup race will travel at the rate of about 25 miles per hour towards a point slightly south of east, the distance, of course, depending upon the length of time that the balloons can keep afloat. In level 3, two of our *ballons-sonde* which reached heights of about seven miles in November, 1904, travelled at an average speed of 100 miles an hour, one 280 miles east, the other 255 miles south-south-east. As this is the average velocity in the upper and lower air strata, the velocity at the maximum altitude in both cases probably much exceeded 100 miles an hour, but such velocities are shown by the measurements of the drift of cirrus clouds at Blue Hill to be not unusual in winter over the United States.

Assuming that the mean temperature for October at St. Louis is 59° F., the temperature at two miles will be about 35° F. and at four miles about 15° F. Though far beyond the reach of the manned balloons, it may be interesting to

state that in January, 1905, at a height of about nine miles – 110° F. was recorded by one of our balloons, which is perhaps the lowest natural temperature ever observed, and that the following July – 75° F. was registered at a height of less than nine miles.

Level.	Number of Ascensions Utilized.	Mean Max. Altitude. (Feet.)	Mean Altitude. (Feet.)	Mean Distance Travelled. (Miles.)	Mean Velocity. (Miles per Hour).	Mean Direction from St. Louis.
4	9	52,500	26,000	117	47	S. 81° E.
3	16	40,500	20,000	155	56	S. 85° E.
2	13	23,500	12,000	101	38	S. 87° E.
1	8	11,500	6,000	42	25	S. 79° E.

A. LAWRENCE ROTCH,
Director.

Blue Hill Meteorological Observatory,
Hyde Park, Mass., U.S.A.
May 11, 1907.

NOTES.

Mr. Knabenshue's New Airship Gas Engine.—Mr. A. Roy Knabenshue's gas engine, which he has lately built for his new airship, is remarkable for combining what is the desideratum in airship engines, lightness and high horse-power. Its weight is said to be only 54 pounds, but it is also said to be capable of yielding 12 to 16 horse-power. The *New York Herald* has obtained the following facts concerning the engine:—"The engine is of a two-cycle pattern, and runs nicely at 100 revolutions a minute. The engine is valveless, and starts absolutely without fail with a half-turn. It will work with any carburettor. One of the features of the engine is the spark coil, which is also a freak. The coil, instead of containing, as do most coils, two windings of wire, a primary and a secondary, contains six windings, the last five of which are looped in series with a battery of condensers. The carburettor throttle and spark timer are also inventions of Mr. Knabenshue. The oil lubricator is different from most others in that it sends the lubricant into the machine with the gas mixture."

The Striking by Lightning of an Italian War Balloon.—History has not yet had to record very many instances of balloons being struck by lightning. On the occasion, however, of the opening by the King and Queen of the national target firing competition organised in connection with the Italian national *fête*, there was a melancholy example of the possibility. During the ceremony a small military balloon, with Captain Ulivelli in the car, was sent up in spite of the threatening weather, and soon reached an altitude of some 1000 feet. When the balloon was passing over a hill, simultaneously with a flash of lightning flames were seen to burst from the balloon, followed by a loud report. The car and the remnants of the balloon descended to the ground with great velocity. The hapless aëronaut was unconscious when he reached the ground, and died shortly after his removal to the hospital.

The Bombardment of War Balloons.—The *Morning Post* recently described the experiments in the bombardment of war balloons which have recently been in progress at Lydd Camp. The war balloon was sent up three miles from where the guns were in action. When it was at a height of about four hundred yards, the artillery opened fire upon it with shrapnel. The first shell missed the balloon, but the second caught it squarely and brought it down "a mass of wreckage."

The International Sporting Exhibition at Berlin.—In the Berlin International Sporting Exhibition, which opened on May 20, there was an Aëronautical Section illustrative of aëronautics of to-day in Germany. Amongst the exhibits were a model of the Zeppelin airship about 3 metres in length, a model of the Parseval airship about $1\frac{1}{2}$ metres in length. The Lindenberg Observatory sent an interesting exhibit of aërology. An interesting item is the completely equipped car used for high ascents. Amongst the flying machines is the original kite of Jatho and the Lilienthal gliding machine.

The Observation of St. Elmo's Fire on a Balloon.—In *La Conquête de L'Air* of June 1 there is a note describing the observation of St. Elmo's fire on the rigging of a balloon. This phenomenon is frequently seen by sailors on the masts of ships, but it does not appear to have been often witnessed on a balloon by aëronauts. On the 20th of June at 5 o'clock in the evening the aëronauts, Messieurs M. N. Charles Levée, Alan Hawley, and Frank Corley, ascended in the balloon "La Mouche" from the grounds of the Aëro-Club of France. About midnight, just after the balloon had passed over Brussels, the aëronauts saw electric fires on the rigging of the balloon, accompanied with crackling sounds resembling the discharges of an electric battery. The height of the balloon at the time was 1110 metres, and the balloon had just experienced a storm of rain. The phenomenon lasted about a quarter of an hour. The aëronauts at first felt anxiety lest the St. Elmo's fire should ignite the