that the faster it went the less weight the plates registered on the scales, until at great speed they almost floated in the air. I found, in fact, that the higher the speed the less was the force required to keep the plates from falling. This seems at first a contradiction of known principles, but I have no time now to explain it. I found that not one twentieth of the force before supposed to be required to support bodies under such conditions was needed, and what before had seemed impossible began to look possible.

"This means that I found," continued Mr. Langley, "that an entirely wrong estimate had been made as to the force needed to sustain moving bodies in the air. Some mathematicians, reasoning from false data, had concluded that if it took a certain amount of power to keep a thing from falling, it would take much additional power to make it advance. My experiments showed just the reverse. I found that it took much less force to push a body rapidly through the air than was needed to simply sustain it there. I found, in short, that the conditions of air travel with my planes and of land and sea travel were in one important respect the opposites of one another. An ocean steamer running at twenty knots an hour will take several times as much coal as is required to run it at the rate of ten knots an hour. The limited express uses a great deal more coal than the slow freight for the same weight and distance. This is not so in aerial flight with planes. Actual experiment shows, I repeat, that the faster the speed the less the force required to sustain the planes, and that it would cost less to transport such planes through the air at a high rate of speed than at a low one. I found further than one horsepower could carry brass plates weighing 200 pounds at the rate of more than forty miles an hour in horizontal flight. Everything, however, depended upon the flight being strictly horizontal. I found that if it were the least irregular the power must be increased in proportion to the irregularity."

"It must have been interesting, Mr. Langley," said I.

"It was interesting," replied Mr. Langley, "but so far it had been conducive to no practical results. I had been working now for years, seeking to learn the principles involved in flight. I thought I discovered some of them. The question was how to apply them. The field, you know, was entirely new. I had to make, and to a large extent, invent the machinery I used. My experiments showed me that I must have a very light engine; but they did not tell me how to get it. They did not show me how to keep the flight horizontal, nor did they give me any idea how such a machine as I might construct could be made to start and light in safety. There were a number of other things which I should have liked to know, and some of which I still hope to learn, which were entirely in the dark. As the result of my work I had some extremely important and valuable facts, but my experiments so far had not told me how to apply those facts to the making of the machines for flying. I had only the conviction that what had hitherto been an impossible fancy might in the future become a mechanical fact. I could see, at any rate, from what I had learned, that the subject was worth a new and scientific investigation."

"How did you go about the work of applying your facts?" said I.

"I next began a very different kind of experiments," replied Mr. Langley. "The average man might have looked upon my next work as somewhat childish. I spent many hours in experimenting upon little toys, which I tried to make actually fly. I had my facts, you know, and I wanted to see how they would work out in actual practice. The only thing that had yet been done in making toys or anything that would fly was by an ingenious Frenchman, named Penoud, who a decade or more ago had made a flying toy by twisting strands of rubber, which in untwisting turned a little propeller wheel made of a couple of feathers. The propellers moved the toy forward. They kept it in the air for a number of seconds, enabling it to fly from fifty to one hundred feet. Simple as this toy looked, it was the father of a future flying machine, and France ought to have the credit of it. I tried the same thing again and again on a larger scale, my object being to learn what the conditions were by which we could secure a horizontal flight in free air."

"What did you find?"

"I idd not find out a great deal. The rubber models flew so irregularly and for so short a time that I could not learn much from them. I soon saw that I must have a better motive power. I must have something that would make a machine fly long enough for me to observe how it flew. In other words, in order to learn how to make a flying machine, I must have a flying machine to begin with.

"I examined and experimented on every kind of a motor," Mr. Langley went on. "I tried compressed air, carbonic acid gas, the storage battery, the primary battery and many other things, including the gas engine. The last was the most promising, and it may some day prove to be the best; but like everything else I found it too heavy, for you see the engine had to be exceedingly light in proportion to the power. After much experiment of this kind I concluded that the only immediate hope was in the steam engine, and that it could only be used provided it could be built to a degree of lightness which had hitherto never been attained. I had to have nearly one horse power to give me a good chance for any practical experiment. Now, it is only a few years since an engine developing this amount of power weighed as much as a horse himself. In other words, it weighed something like 1,000 pounds. I had to have a one horse power engine and boiler which together would weigh less than ten pounds, or one-hundredth the weight of a horse, and I at once went to work to make it. It took me a year to construct it, and I had the best of mechanics to help me. I reduced the weight atom by atom, building and re-building, until now I have what I believe to be the smallest one horse power engine in the world. Its moving parts, as I told you, weigh just twenty-six ounces, or less than two pounds. As it was with the engine, so it has been with every part of the machine. Every part of it has had to be made over and over again, until, as the result of the greater part of my leisure for the past fifteen years, I have accomplished what you have seen today."

"Yes, Mr. Langley," said I, "that is true, you have worked, but you have succeeded."

"Yes," replied Mr. Langley, "I have succeeded. I have proved both theoretically and practically that machines can be made which will travel through the air. The question of the development of the fact is one of the future. My motive and interest in the work up to this time have been purely scientific ones, but if I had the time and money to spend upon the construction of a large machine, I believe I could make one on a scale such as would demonstrate to the world that a large passenger-carrying flying machine can be a commercial as well as a scientific success. There are many things yet to be learned concerning it, but I have no doubt that they will be discovered in the future. The moment that men see that such machines are not only practicable, but that they may be made commercially profitable, there will be a thousand inventors working upon the problem where there is now one. I believe, however, that the flying machine will first come into national use in the arts of war rather than those of peace. In an event of a great war by means of an aerial machine the armies of one nation will be able to know exactly what those of the enemy are doing, thus radically changing present military strategy and tactics, to say nothing of their power of dropping down bombs out of the sky. I believe, however, that such inventions will finally be of even greater advantage in the arts of peace. I have faith that the swiftest and perhaps the most luxurious, if not the safest, traveling in the future may be through the air."

"But will it not be impossible to induce people to risk their lives in the first experiments on such machines?"

"I think not," replied Mr. Langley. "If I had a large ærodrome constructed on the principles of the one you have seen today, though the danger of the initial experiment would undoubtedly be great, I am sure I should have to turn away any number of men who would be anxious to risk a flight upon it."

Frank G. Carpenter

NEBRASKA CONFERENCE.

The Nebraska conference of the Church of Jesus Christ of Latter-day Saints, met on the 21st and 22nd of November, 1896, in the Christian church house, Blair, Nebraska. There were present the following Elders. W. E. Criddle, W. C. Hudson, A G. Young, J. A. Fawson, George A. Whittock, Lee S. Robinson, Joseph Jones, L. Mechom, the latter two just from Idaho, also Samuel G. Spencer and L. H. Kelsch. Brother Kelsch is to succeed Elder Spencer as president of the Northern States mission; the latter having been released to return home in the near future.

Conference was called to order by Elder W. E. Criddle at 10 o'clock a. m., on the first date mentioned. The first meeting was devoted to hearing the Elders speak of their experience during the past few months. Each bore a strong testimony to the goodness of God and gave a reason for the hope that was within him. The rest of the conference was devoted to hearing the Elders speak upon the first principles of the Gospel. By request Elder Spencer spoke upon the subject of marriage, and was listened