

AERIAL NAVIGATION.

Is the Problem Approaching Solution?

FLYING MACHINES AND AIR SHIPS TO CLEAVE THE BLUE ETHER.

[Mr. Walker, the editor of the *Cosmopolitan Magazine*, has taken up the subject of Aerial Navigation and has been for some months in communication with the most noted scientists of the day regarding that subject, under whose direction a number of important experiments will be made. Mr. Walker presents below a brief review of the present condition of the science.]

War, which has been the mother of many inventions, gave an impetus to the study of movement through the air. "We must get out of Paris," said the Parisian envoys; but how, with a Krupp rifle commanding every approach? A balloon served the purpose. At the close of the Franco-Prussian War the French government gave the sanction to experiments by engineer officers which should have been given years before. In consequence partly of the impetus given by the war, and partly by the development made in electric motors, ample means were confided to Messrs. Krebs and Reynard to push experiments in this line. The result of their work was an elongated gas bag with car, to which was attached a two-bladed propeller driven by an electric motor. Out of seven trips made in La France—the name given to their balloon—in five they succeeded in returning to the point of their beginning. Progress was made in the direction of lightness of motor in the construction of elongated gas holders and the efficiency of propeller blades, but the experiments did not involve any radical or novel departure. In fact, La France involved no more than the fulfillment of plans submitted to the French government sixteen years before by an American.

Three men have done much toward the consideration of this subject in this country. The first, Mr. Edmund Clarence Stedman, poet and author, at the risk of being denominated a crank of a high order, did not hesitate to publish in the *Century Magazine*, in the year 1879, a delightful article outlining the possibilities, suggesting not a few points that were practical in character, although he did not pretend to attack the subject as a scientific man, and calling attention to the curious phenomena presented, that while this particular invention outdied in importance all other mechanical subjects it had been confined in its consideration in the past almost exclusively to dreamers and unscientific men. That whereas millions of dollars had been forthcoming for the development of almost every machine that promised usefulness to the human race the aerial ship alone had been refused funds sufficient to try even the most simple experiments. Mr. Stedman, since the writing of his article, has been a close student, and is violating no confidence to say that he is to-day one of the firmest believers in an early solution of the problem.

TO CELEBRATE BY CONTRAST.

Another literary man, Mr. Loretus Metcalf, for many years the editor of the *Forum*, takes a strong interest in all matters pertaining to aerial transit, and it is at his suggestion that the subject has been taken actively in hand by the *Cosmopolitan Magazine*. Mr. Metcalf would like to see the setting forth of an American aerial ship on the 14th of August, 1892, for the shores of Spain, four hundred years after the sailing of Columbus in search of the New World. While the most sanguine may not hope for such a probability, yet the idea is one that takes a strong hold of the imaginative mind as the most fitting celebration of this four hundredth anniversary.

After Mr. Stedman, the man who came next to advance the consideration of this important subject, was Professor P. S. Langley, at the head of the Smithsonian Institution. Standing as the foremost representative of scientific pursuits in this country, Professor Langley has not hesitated to say plainly and unequivocally that the subject comes properly under the domain of science; that it is worthy the attention of the ablest engineers and inventors, and that he believes it to be in a fair way to an early solution. He has made numerous experiments which have demonstrated the ease with which a plane may be driven through the air with comparatively slight expenditure of power, and he has succeeded, it is said, in producing a motor which combines great energy with marvelous lightness.

MR. CHANUTE'S SUGGESTION.

The third name to which America will be indebted, if this matter ever reaches a successful conclusion, is Mr. Octave Chanute, president of the American Institute of Civil Engineers. He has not only studied closely, but has written, with confidence as to the future, a number of articles calculated to excite interest in the subject and induce its consideration by the inventive mind. Very curiously, in reading one of Mr. Chanute's pamphlets, written in 1890, and which only came to the notice of the writer after the programme of the *Cosmopolitan* had been announced, there is found a suggestion which coincides almost identically with the plan of operations adopted by the *Cosmopolitan*. "Success might be much hastened," suggests Mr. Chanute, "by an association of searchers in this field of inquiry, for no one man is likely to be simultaneously an inventor, to imagine new shapes and new motors, a mechanical engineer, to design the arrangement of the apparatus, a mathematician, to calculate its strength and stresses, a practical mechanic, to construct the parts, and a syndicate of capitalists, to furnish the needed funds. It is probable the working out of a complex invention requires so great a variety of talent that progress has been so slow."

My hope in the matter lies directly in these lines. Already the assistance of able men has been promised—brains furnishing all the requisites for a proper solution of a problem which is, after all, entirely within the limits of scientific accomplishment, if we take the word of those who have a right to speak. The work of the *Cosmopolitan* will be to assimilate the plans of the various inventors and give practical form to those best calculated to serve the purposes of aerial transit.

THE PRESENT CONDITIONS.

The conditions of aerial science—for so we may term it—may be divided roughly into two divisions—first, the work of the aeronauts, which involves the buoyant forms of gas for its operations; second, the experiments of those who hope to drive through the air planes which will depend for their support upon the principle known to the skater who travels with rapidity over a thin

frozen surface, or the schoolboy who sends by force of arm a thin piece of slate sailing high in the air.

The aeronauts may be termed the old school, while the more modern school, embracing noted scientists, attacks the subject radically and claims that the matter has resolved itself into a question of motors. The well known inventor, Mr. Maxim, belongs to this school, and it is announced that he has succeeded in perfecting an 800 horse power engine of weight so disproportionate to its power that it is hardly worth calculating, and which may be safely used to operate an aeroplane. It is probable that the first experiment we make will be in this line of combining the salient features of the school.

Practical aeronauts have not been the most sanguine in regard to the future of the balloon to be driven through the air by power. They have been accustomed to the voluminous gas bags required for any continued travel in the air—the expenditure of gas in order to descend, the expenditure of ballast in order to ascend, requiring a lifting power vastly greater than would be needed were the gas preserved in a metallic envelope and power used for elevation or depression. Familiar, then, with a vast envelope surrounded by a network of cords generating friction, swaying with every puff of wind and completely at the mercy of the most trifling currents of air, it is no wonder that experience has caused them to doubt the feasibility of a construction which may be driven in the teeth of a gale. But the experiments of the French engineer, demonstrated that a spindle shaped object is capable of being projected in the teeth of a moderate breeze and that the overcoming of a heavy gale is only a question of motive power.

THE BOURDON TUBE.

In speaking of his invention M. Trouve says:—"Attention is called to the extensive cooling of the surface of the Bourdon tube, and the direct contact with the air, which will be closer as the velocity is greater, and will keep it at a moderate temperature. Yet there will be little danger of its getting heated, for the simplicity of the mechanism, the absence of all rotary or sliding parts for transmission, saves loss by friction and does away with the necessity for lubricants." N. Trouve believes that the combined advantages of the generator-motor-propeller render it the lightest aviator that it is possible to construct. It possesses, he believes, every warrant of essential power and safe return. He says in conclusion of the description of his machine:—"We shall be glad if we have succeeded in conveying to our readers the faith we have in the possibility and the near realization of practical navigation of the air."

No ingenious combination of words can convey an adequate idea of a day spent in the basket of a balloon. No view that rewards the climber of the Alpine peaks can rival the vastness of the panorama seen from an air ship. At an elevation of two miles we have the running of many streams, of cascades leaping over rocks, the sighing of the gale through the forests, the roar of breakers upon a far away shore; the tinkling of bells; drifting above a silvery sea of clouds we see through the rifts pictures of rivers and green fields and the white dots of village homes.

CHASMS ON THE SUN'S FACE.

Peculiar Characteristics of a Solar Spot that is now Visible.

Astronomers are intensely interested just now in the great sun spot recently developed on the eastern limb of the sun. By means of a piece of smoked glass anybody may observe this great chasm on the sun's face, and it will well repay observation. A warning must be given, however, against the inexperienced use of an opera glass in this connection, as the concentration of the sun's powerful rays is sufficient to crack the glass or burn the eyes.

Sun spots will probably be much talked of this year, as a spot period is now approaching, and during a maximum the sun's surface is hardly ever free from them. Sometimes as many as forty or fifty will be visible at once, while at a minimum not one will be seen for weeks. The spot period is about eleven years. The last maximum was in 1883-84, but it was a year behind time.

It has been established that there is a decided connection between these violent disturbances on the sun and so-called magnetic storms on earth—such manifestations, for example, as the gorgeous aurora borealis. Sun spots are vast cavities on the photosphere of the sun, and it is as yet uncertain whether they are caused by or are the cause of eruptions on that intensely-heated luminary. They are usually found in two zones extending from 5° to 40° of latitude north and south of the sun's equator, and develop rapidly, lasting but a comparatively short time—from a few days to a month or two. One spot was known to have lasted for over fifteen months, but that was an exception.

They are usually quite irregular in shape, and are composed of two parts—namely, the umbra, or black center, which is dark because filled with cooler gases and vapors which consequently absorb light; and the fringing gray penumbra, consisting of long, feathery filaments reaching toward the middle of the umbra, and usually very lovely in form. The diameter of an umbra varies from 500 to 1,000 miles in a small spot to tremendous rents of 50,000 or 60,000 miles in a large one, into which our little earth might be dropped many times without making an impression on the penumbra.

Progress in Science.

The long-taken of utilization of the force of ocean waves has been successfully put in practice on the coast of France, where this power is used to lift heavy blocks of granite.

It has been found that by the use of the sand blast the lettering on tombstones can be at greatly reduced cost, with no sacrifice of beauty in the result.

A Frenchman named Moissau has succeeded in isolating fluorine gas. Its affinity for other substances has heretofore rendered this extremely difficult.

Mr. Haly of the Colombo Museum has discovered that carbolic oil is one of the best preservatives of the colors of fish and other animal specimens.

Electric push buttons, using dry batteries are in successful operation on the cable road in San Diego.

It has been discovered that colors when passing through a prism can be made to produce sound.

MOROCCO'S TREASURE HOUSE.

Hoarding Gold and Silver Under Ground with 300 Black Soldiers to Guard Them.

Morocco has a famous treasure house which, although not so important as it was once, still contains a large part of the Sultan's accumulations from the heavy taxes imposed on his people. There are at present three sub-treasuries where a considerable part of the country's revenue is kept. The chief repository, however, and the only one which is well known, is at Miknas, on the road between Fez and the city of Morocco.

In the course of time an immense amount of money has been kept in that strongly guarded receptacle. The treasure is in the form of gold and silver, a good deal of it coined and a great deal in the form of bar metal.

Morocco is not a very expensive Government to carry on, although the people are burdened with heavy taxes. The Sultan's outgo is chiefly for the expenses of his court, for the payment of his pension roll, which amounts to a considerable sum, for theological schools, for the entertainment of his guests, and for his army, which, however, is not a heavy drain on the treasury.

The officers of the State cost the Government comparatively little, for they are expected, in their own provinces, to bleed the people for their personal advantage, and they live right up to their privileges. Very little is expended for streets, roads, bridges, prisons and other things which cost most governments a great deal of money. The Sultan hoards a large part of the sums he receives from taxes to add to his personal fortune and to pay the expenses of war, should he be so unlucky as to become involved in trouble with his European friends. The debt he owes Spain on account of the unpleasantness between that country and his own years ago is not paid yet, although the sum is being diminished rapidly, as Spain takes one-half of the total customs duties collected at Moroccan ports.

Nobody knows how great the sum of money is that is held in the treasure boxes of Morocco, but it is supposed to be enormous. Morocco has a population of about 8,000,000 people, and although most of them are very poor, the tax gatherers contrive to squeeze a good deal of money out of them. Miknas has been the royal treasury for some centuries. The treasury building is a short distance outside of the city. Its stone walls are very high and thick. To get inside these walls one has to pass through three great iron doors. If thieves could get inside all these doors they yet might not be able to secure the treasure. The interior is a long, narrow hall, as dark as pitch, which is the passageway to the iron trap door, abundantly supplied with locks, which is let into the stone flooring, and leads to an underground apartment, where the treasure is kept in a large room called the treasure chamber. The building is guarded constantly by 300 negro slaves, who are a part of the Sultan's army, and are never permitted to leave the neighborhood.

The treasure house is opened only once a year. At that time the Sultan either comes in person or sends one of his most trusted officials. The purpose, usually, is not to take any treasure away, but to add to the hoard, because the Sultan retains from the taxes a sufficient sum to meet all the expenses of his court and government. As a rule, therefore, unless the Sultan has had an unusually unpleasant time with the Berbers, who are in rebellion often, and determined, apparently, to make the Sultan's life a burden to him, the accumulations in the treasury are not diminished.

The sub-treasuries, which have existed within the past few years only, are at Fez, the city of Morocco, and in the oasis of Tafilalet, south of the Atlas Mountains, among the Filali people. The shrewd Sultan, in hiding a part of his revenue in the desert of Sahara, is providing, undoubtedly, for the possibility that he may be compelled to leave his throne and seek safety in flight some day. He proposes, if that unhappy event occurs, to have money enough for a rainy day in a region that is not accessible easily. It is said that the treasure is kept in the oasis is very much larger than the amount deposited in the other sub-treasuries, and that the Sultan has been considering seriously the advisability of carting off most of the money he keeps at Miknas to Tafilalet. Miknas is on the road to the city of Morocco, and should the Sultan be involved in war with an invading European power it is likely that one of the first enterprises would be to get possession of the treasure house at Miknas. The soldier slaves who guard the house are called the black guard. A great many fables and rumors about this treasure house have been recorded, but the foregoing facts are unagitated, and very little more is known, actually about the treasure.

A Coming Storm in Germany.

The German Emperor for the first time confronted by the united opposition of the many parliamentary parties included by the term Liberals. The strong front opposed to the bill for the introduction of sectarian teaching into the schools is evidence that the Liberal party is learning its strength, and finds that it can cope even with favorite schemes of the Emperor. This incident points to a near future when the people will assert their power, and, that once learnt, it will not be long before the degrading military despotism of Germany becomes a part of the past. The Emperor William has in many ways shown himself a man of no mean abilities, and that he is capable to an unusual degree of realizing and coping with the questions of the time. But his opinions on the divine right of sovereigns and all that hangs thereby are medieval. Cope with it as the Government may, whether by seeking to forestall some of its demands by legislation, or by the endeavor to suppress it in other directions, socialism is a rapidly increasing power in the German Empire. The first institution to be seriously attacked will be the military system. Recent exposures of the cruel practices of the subordinate army officers are small compared with the grievances felt at the severity of the autocratic regulations for the preservation of the dignity of the higher officers. Not content with robbing men of some of the best years of their life, the military system demands such a subject department from the private as better befits slaves than the citizens of a civilized and enlightened country. The feeling against the enforced military service is such a growing one that the smoke may burst into flame at almost any moment, and where the conflagration will cease it is impossible to foretell.

WINTER DEER HUNTING.

Snow-Shoeing in the Rockies—How the Mounted Police Kill Big Game.

An officer of the force writes:—"For three years our detachment was stationed at Fort Spruce, and in company with a brother officer, an ardent and accomplished sportsman, I spent a great deal of time in the mountains.

The winter hunting was always best after a fresh fall of snow. The old trails made by the animals were partly filled up and the new trails could be followed easily.

Still, this advantage was about balanced by the absence of foliage, and the consequent great distance at which the hunter became visible; also the glistening white surface of the snow lit up the recesses of the thickest woods, and we had to take the utmost care to avoid being discovered by the game. Then too, when the thaw and frost alternated the snow-crush became thick and the sound made by walking through could be heard long distances. Even with snowshoes this caused the loss of many a promising chance to get within shot of game we had followed for hours, and sometimes it sent us to bed supperless.

The hunting ground decided, our first care was to find a secure spot to pitch the tent. The thermometer often fell to 40 degrees and 50 degrees below zero, and a sheltered place near wood and water, was a necessity. The very best shelter was in thickets of "lodge-pole" pines, so called because the Indians use them as poles for their "lodges" or tents; they grow so close together that it is often impossible to squeeze between them. Growing tall and free from branches, and only two or three inches in diameter, a sufficient space could be easily cleared. Our beds were made of the fragrant ends of pine and tamarac boughs, covered with buffalo robes and blankets. Then the Sibley stove lighted, we could defy wind and weather.

As soon as it was light in the morning we cooked our breakfast and were off.

Our hunting suits consisted of heavy underwear, "prairie broadcloth" (canvas) coat and trousers, moccasins or rubber boots under which was worn several pairs of stockings a flannel shirt, and a close-fitting cap that could be pulled down over most of the head in case of a blizzard. But such was the violent exertion of those mountain climbs the cap was never worn unless we had to face a storm; it was habitually carried slung to the belt and an ordinary white handkerchief was tied around the head. Our appearance with this head-gear, and our faces well blackened around the eyes with charcoal to lessen the effect of the light and prevent snowblindness, was anything but prepossessing, but the comfort was unspeakable.

Soon after leaving camp the coats would follow the caps and be slung to the belts or the light, strong rope that each, carried around the waist or over the shoulder.

On cold nights the deer leave the mountains and come down to the valleys and take shelter in the brush by the streams. When the day breaks they commence to climb the mountains, feeding as they go. This habit gives the hunter who makes an early start an opportunity to head them off and as they are feeding it is easy to approach unseen.

On this particular hunt my friend and I followed the spurs of the mountain and we soon were walking along the first plateau on an old deer trail well beaten in the deep snow. Expecting to find a fresh trail any minute we put on our snow-shoes and as it was a little late turned off up the side of the mountain.

Soon the rising sun made it sufficiently light to see distant objects, and on the side of a little gulch we made out lines of irregular, meandering trails, leading from one good feeding ground to another. The next moment we discovered that three deer were above us. Unless they had seen us we would be able to head them off and get a shot at them.

Retracing our steps until we reached the gulch adjoining this we silently snow-shoed rapidly up it. After ascending a half mile we crossed back and approached carefully, looked about for our game, but no deer was to be seen.

Continuing on upward we reached an overhanging cliff when we saw our three deer emerging from the same gulch we had so rapidly toiled up in order to head them off. For some reason they had crossed over, too, and had leisurely followed up in our footsteps.

But they were pursuing a course that soon would bring them within easy range. Moving back from the edge of the cliff, we made ourselves comfortable and waited for them. When they got close we took positions where we could see, but not be seen, settled to whom the first shot belonged, opened fire, and were fortunate enough to get them all.

Then came the prosaic part of hunting large game—butchering it. My companion and I had reduced this to a science. We always hunted together, for the localities we most frequented were rugged and dangerous, especially so in winter. One of our brother officers had lost his life—frozen to death—while hunting, and we found a decided comfort in being together when danger came upon us, as it often did; besides it lightened our work.

We always butchered our game, and in winter dragged it into camp, sometimes five miles. In butchering we took the light ropes that we carried and swung the deer up by his hind legs between two trees; this made the work comparatively light.

The three deer thus disposed of, we made tea in a tin quart cup, melting snow for water over a little fire. Lunch over, we tied the ropes around the necks of the deer a half hitch being taken around their noses, and then the homeward haul commenced.

Keeping along the mountain side we finally gained a point nearly above our camp. Then we put in practice a labor-saving device that generally afforded us much satisfaction.

Selecting a slope free from trees and brush, one of the deer was let to slide down the declivity. The other two, now frozen stiff, were arranged as toboggans, their heads pointing down hill so that they would slide with the grain of the hair. Then sitting astride and holding on to the fore legs, down over the thick crust we flew.

When the crust was hard considerable speed would be attained. Our only fear was that our improvised toboggans would—and they often did—either break through a weak place in the crust, or strike a projecting branch of some fallen snow-covered pine; in either case we and our toboggans instantly parted company and went rolling over and over. But our experience were never unpleasant enough to deter us from taking

this rough-and-ready method to get home quickly.

Sometimes hauling, sometimes sliding, we at last arrived at camp where the deer were hung up to lodge-poles.

Then supper and an early bed.

HYPNOTISM.

People Made to do all Sorts of Things—Horses Shod While Hypnotized.

Hypnotism, of the practical advantages of which we do not hear so much as formerly, is made the subject of an able critical article in the *Nineteenth Century* by Dr. Ernest Hart. The paper is mainly devoted to a sharp discrimination between perfectly recognized natural phenomena and the nonsense and humbug which have grown up about them. The facts of hypnotism are well known. It is well known that through hypnotic suggestion people can be put to sleep or can put themselves to sleep. They can be made to do all sorts of things of which they are unconscious and which they cannot help doing. But they cannot read with their eyes bandaged or give the number on a bank note which they do not see. These pretensions have been put to the test time and time again, always with the result of showing them to be humbug. In 1837 the French Academy appointed a commission to investigate the claims of blindfold subjects to read without using their eyes, and the pretensions of all of them were disproved. A prize of 3,000 francs was next offered to anybody who could read without the use of the eyes, and the six candidates who appeared to claim it all failed. In 1840 the Academy decided that there was no such thing as animal magnetism and refused to respond to any more communications on the subject.

Some thirty years ago Sir James Simpson offered a five-hundred-pound note to any one who could read the number on it, and the note was never claimed. Mr. Labouche's experiment with the thought-reader Bishop, is of very recent memory. The explanations of the phenomena are due to electricity and magnetism have a long history. Mesmer, at the time when he was the wonder of Paris and his rooms were filled with royalties and ladies of fashion, had two large, highly complicated tubes filled with the supposed electric fluid, which were connected by wires with handles which his subjects held. But no electricity was ever found in the tubes. Mesmer presently left France with \$80,000 which he had made with his cures. The fashion and the faith died away, and there were no more cures. The writer tells us that he has himself at a very early period in his investigations proved that electricity had nothing to do with it. The use of the most delicate electrical instruments failed to show that there were any differences either in his own electrical condition or that of his subjects. He satisfied himself also that the will had nothing to do with it. The patient did what he thought the operator was willing him to do, and not what he really did will him to do. If the patient believed the operator would him to go to sleep, he did so, no matter how strongly the operator was willing that he should not go to sleep.

The writer mentions the case of a young lady staying in a country house in which he was. She had a bad cough and could not sleep. He thought it a good opportunity for a control experiment and set her down before a lighted candle, having told her that he had mesmerized it. The cough ceased and the young lady went to sleep and did not wake till noon of the next day. She sat opposite him at dinner and still believing that he wished to mesmerize her, again went to sleep and had to be led from the table. Notwithstanding the doctor's assurances to the contrary, she remained convinced that he meant to mesmerize her and was so constantly drowsy that she was sent back to London. This mesmerized candle was very like the tree which Mesmer mesmerized in Paris and about which people, joining hands and looking intently at the tree, would go to sleep. The explanation of hypnotism is to be found in the nature of the brain and nerves. The brain is composed internally of nerve masses, which are connected with the involuntary actions of the body, and on the outside of that gray matter in which the will and the directing power reside. At the base of the brain is a circle of arteries which send out blood vessels through all parts of the brain. During natural sleep the outer and upper parts of the brain, as we know from observing the brains of animals which have been removed, loses its usual pink color and becomes almost bloodless. This is due to the contraction of the blood vessels of the brain. The same contraction takes place when the upper part of the brain, which is the home of the will, is under the influence of hypnotic suggestion. As sleep may be induced so may the hypnotic state be induced. The writer has little to say upon the subject of the value of hypnotism in practical medicine, contenting himself with a statement of the natural facts and of the sharp distinctions between these facts and the delusions which quacks have mixed up with them. He mentions, however, one instance of the practical employment of this agency which is interesting. Horses are understood to be very subject to hypnotization, the method being to stand in front of them so that they have to look at one fixedly. The practice was introduced into the Austrian army by a cavalry officer named Balassa, and hence is called "Balassaren." It has been adopted by law in Austria for the shooing of horses in the army.

A trade circular just issued from Montreal to Canadian millers says: "We are exceedingly sorry to see that the difficulties between Canada and Newfoundland over the fishery question have brought about a differential tax on all Canadian flours entering Newfoundland. This tax is \$1.00 a barrel, while all United States flours are admitted on the former tariff of 30 cents a barrel. This difference of 75 cents a barrel against us is simply prohibitory for the Canadian trade. Newfoundland requires every year 300,000 to 350,000 barrels of flour; and we are certain that there will be no difficulty in Canadian millers securing the bulk of this trade if we are placed on equal terms with our American competitors. Canadian flours are on a level with or little below those of American millers. We fully rely on your aid in this matter, and suggest that every miller should at once communicate with the representative of his district in Parliament and also write to the Millers' Association in support of this effort, otherwise the share of Newfoundland's spring orders for flour, which certainly belongs to Canada, will go to the American millers."