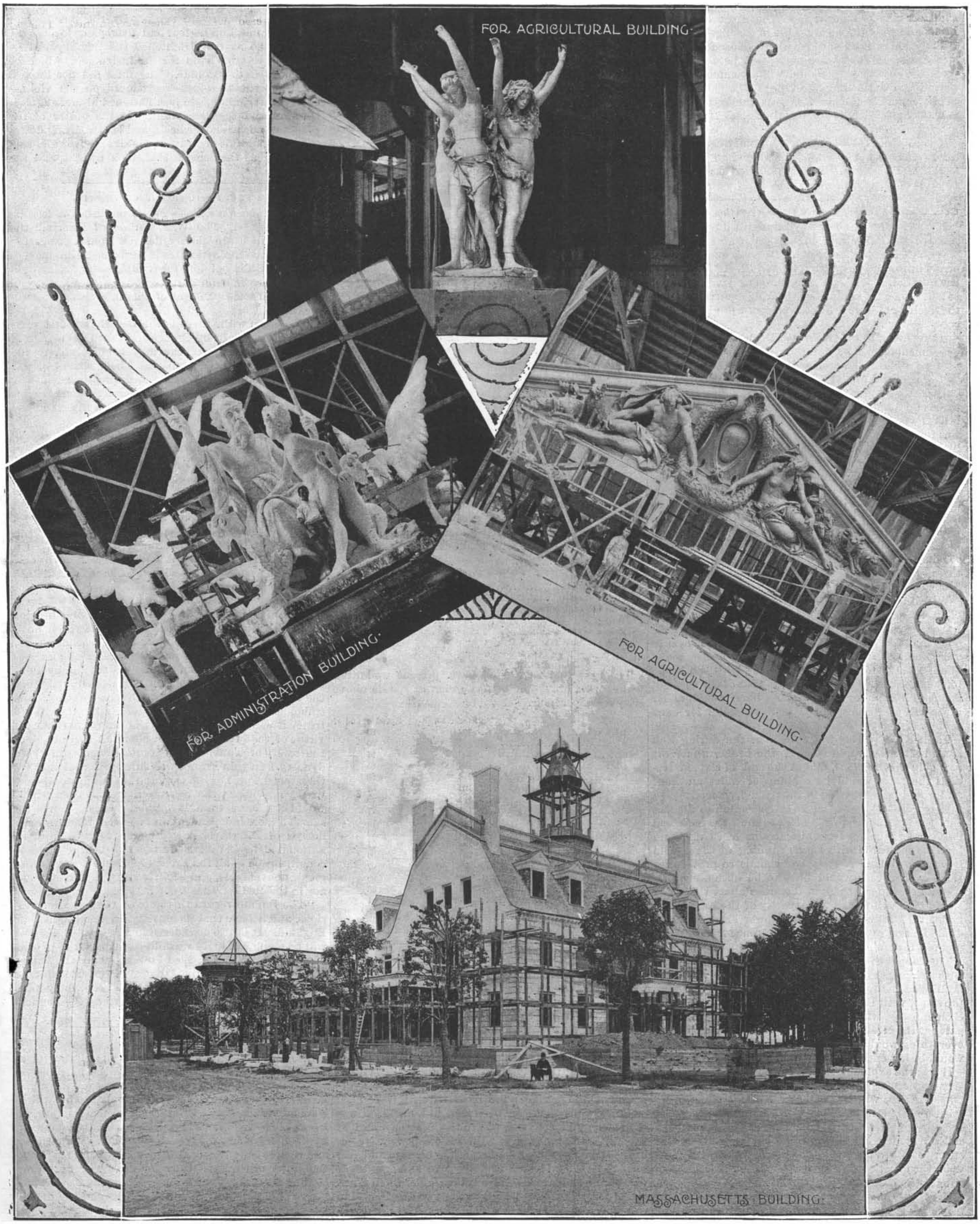
THE GREAT EXPOSITION.

Our illustrations herewith, of three groups by different sculptors, for the ornamentation of the Agricultural and Administration buildings, afford only a suggestion of the great wealth of artistic work of a high character now approaching completion and being placed in position on the several structures which have so quickly sprung into being upon the exposition grounds. The great buildings afford an almost unlimited field for the architect and the artist, which is being availed of to complete the buildings with a richness and appropriateness of decoration that seems little short of marvelous, considering the shortness of the time allowed for the work, and which will effectually put out of the mind the temporary character of most of the structures.

The state of the work upon the Massachusetts building gives a fair idea of the condition of forwardness exhibited also by many other State structures, on all of which operations are being conducted with an energy which gives every promise of their completion in ample time to serve the purposes designed as adjuncts of the great exposition. Structures for the use of the officials and visitors from Illinois, Kansas, West Virginia, Rhode Island, Massachusetts, Connecticut, New Hampshire, Iowa, Maine, Arkansas, Indiana, Ohio, Pennsylvania, Nebraska, Montana, Maryland, and Delaware, were inclosed and roofed before the middle of September.

For some time past preparations for the dedicatory ceremonies have been engrossing the attention of the exposition authorities to the exclusion of almost everything else. The number of invited guests (about 100,000) is so large that it will be impossible to admit the general public to the grounds. Chairs have been provided for 90,000 people in the Manufactures build-



PROGRESS OF WORK FOR THE WORLD'S COLUMBIAN EXPOSITION.

ing, and there is standing room for 35,000 more. There is to be a chorus of 5,000 singers and an orchestra of 300 pieces.

This great building, in which the exercises are to be held, faces the lake, and has four great entrances in the manner of triumphal arches, the central archway of each being forty feet wide and eighty feet high. The long array of arches and columns is relieved from monotony by elaborate ornamentation, so that every part of its great length presents new and interesting features. A fifty foot gallery extends around all four sides of the building, and from this extend eighty-six smaller galleries, twelve feet wide, from which the sightseer may look down upon the great array of exhibits and the throngs of people in the big hall below.

The main railway station, where all excursion trains will discharge their passengers, will be a handsome structure costing $225,000 and will accommodate 25,000 persons at one time.

The report of the auditor gave the receipts up to Aug. 31 as $10,401,045; expenditures, $8,743,259; balance, $1,657,785.

The total sum of all contracts for buildings and other improvements was $9,981,372, on which had been paid, as the work progressed, $5,219,550, leaving a balance payable of $4,761,821.

Geo. Westinghouse, Jr., on "Ninety Miles an Hour."

My attention has recently been called to an article relative to brakes and high speed trains in which I was quoted as the authority. In consequence of the errors in the article referred to, and the importance of the questions raised, I desire, through your columns, to state some important facts bearing upon the subject, to which I am sure railroad officers will give careful consideration.

By referring to the celebrated Douglas Galton brake experiments it will be seen that, with the brakes in the best possible order, acting upon all of the wheels of one vehicle and up to their theoretical efficiency, it was only possible to reduce the speed at the rate of about three and a half miles per hour for each second the brakes were applied until the vehicle stopped; and it was further found, during these experiments, that the higher the speed, the less the brakeshoes retarded the wheels with a given force applied to them; and that at 60 miles and upward, the brake force to be thoroughly efficient would have to be at least double that now usually employed in daily practice at speeds below 50 miles. With trains of considerable length it was shown that, with the brakes in the most perfect order possible, trains could be brought to stand from a speed of 60 miles an hour within about 1,200 feet, the brakes in these cases acting upon about 95 per cent of the weight borne by the wheels of the train.

With a *perfect brake*, acting upon all of the wheels of an express train running at 90 miles an hour, it will be seen from Table No. 1 that at the end of ten seconds the train would still be moving at a little over 60 miles an hour, and would have traveled a distance of about 1,130 feet. As a matter of fact, with the brake force now fitted to trains, the reduction of the speed of trains running above 60 miles an hour would, under favorable conditions, not exceed two miles for each second.

Table No. 2 will show the distance run during each second after the application of the brake, *under the best actual conditions*, and at the end of sixteen seconds the train would be running 61 miles an hour and would have traveled in that time 1,796 feet.

It requires no more than to call attention to the fact that the human vision is limited to show the increased risk that is incurred running trains at 90 miles an hour, as compared with trains running at 60 miles an hour and under. A system of signals to provide for these high speeds would have to be absolutely perfect, and arranged at such distances apart that they would necessarily limit the capacity of the road for all trains that are run at a much lower speed, unless a double set of signals were provided, one for high speed and one for low speed.

The danger to a person crossing the tracks at a level with trains running at these high speeds would be multiplied many times, unless a system of gates were provided, with danger signals at nearly a mile from each crossing, which could only be lowered when the gates at the crossing had been properly closed; in fact, everything would have to be arranged so that nothing would be left entirely to the judgment of man.

It was the explanation of these points in a conversation, concerning the running of trains at high speed by electricity, with a writer of a daily paper, who was interested in the subject, which probably formed the basis of the article to which my attention has been called. It may, therefore, not be out of place in this letter to state a few facts which will bear with force upon the question of substituting an electric locomotive for the present steam locomotive.

Electricity on Standard Railroads.—The modern passenger locomotive, for high speed trains, must be capable of developing at least 1,200 horse power, and it costs about $10,000; that is, the engine, boiler, feed pumps, steam piping, and everything necessary to produce motion cost about $8 per horse power. For the operation of a train by electricity, in place of one steam locomotive there would be required the following principal items, costing, according to present prices of electrical apparatus, approximately the figures set opposite:

A stationary steam boiler, 1,600 horse power	$16,000
A stationary engine, 1,600 horse power	18,000
An electric generator, 1,600 horse power	25,000
Motor for locomotive, 1,400 horse power	22,000
	$81,000

In addition to the above there would have to be added the proportionate cost of the buildings and outside electrical construction for the transmission of the electricity from the generator to the locomotive.

There are innumerable places where electrical power will profitably supplant the steam engine, but I feel confident that the above figures, or any modification that may reasonably be expected, will be a most serious obstacle to the utilization of electricity for moving standard railroad trains, even provided all of the mechanical details necessary for the transfer of electrical energy of 1,200 H. P. from a stationary to a moving object shall be satisfactorily worked out.

GEO. WESTINGHOUSE, JR.

TABLE NO. 1.

Speed	90 miles per hour.
Feet per second	132
Time lost applying brakes	1 second, with full application at end of second second.
Reduction first second	0 miles.
" second second	1¾ "
" each second after	3½ "

With the above condition, the following figures are almost accurate (fractions omitted):

Seconds.	Feet traveled.	Speed at end of
1st	132	90
2d	131−	88¼
3d	126−	84¾
4th	121+	81¼
5th	116+	77¾
6th	111+	74¼
7th	106+	70¾
8th	101+	67¼
9th	96+	63¾
10th	90+	60¼
Total run	1,130 feet in ten seconds.	

To obtain the above results upon dry rails and upon the level would require a brake force of at least three times the total weight of the train, and this should be properly distributed upon every wheel in the train, and there would be needed a device on each car to automatically reduce the brakeshoe pressure as the speed decreased.

TABLE NO. 2.

Speed	90 miles per hour.
Feet per second	132
Time lost applying brakes	1 second, with full application at end of second second.
Reduction first second	0 miles.
" second second	1 "
" each second after	2 "

The best to be expected from present well-fitted trains, with brakes in perfect order, in speeds above sixty miles per hour.

Seconds.	Feet traveled.	Speed at end of
1st	132	90
2d	131	89
3d	129	87
4th	126	85
5th	123	83
6th	120	81
7th	117	79
8th	114	77
9th	111	75
10th	108	73
11th	105	71
12th	102	69
13th	99	67
14th	96	65
15th	93	63
16th	90	61
Total run	1,796 feet in 16 seconds.	

—*Railroad Gazette.*

The Musical Orang-Outang.

A correspondent of the *Spectator*, who has been making experiments with various musical instruments on the animals at the Zoological Gardens, writes as follows with regard to one of his latest tests:

Our first visit was paid to "Jack," the young red orang-outang, which, since the death of "Sally," the chimpanzee, claims the highest place in animal organization among the inmates of the Zoo. He is a six-months' old baby, of extremely grave and deliberate manners, and perhaps the most irresistibly comical creature which has ever been seen in London. He is extremely well behaved, not in the least shy, and as friendly with strangers as with his keeper. His arms are as strong as those of a man, while his legs and feet seem to be used less for walking than as a subsidiary pair of arms and hands. He is thus able, when much interested, to hold his face between two hands, and to rest his chin on a third, which gives him an air of pondering reflection beyond any power of human imitation. "He knows there's something up," remarked his keeper, as we entered the house, and the ape came to the bars and sat down to inspect his visitors. As the sounds of the violin began, he suspended himself against the bars, and then, with one hand above his head, dropped the other to his side, and listened with grave attention. As the sound increased in volume, he dropped to the ground, and all the hair on his body stood up with fear. He then crept away on all fours, looking back over his shoulder like a frightened baby; and taking up his piece of carpet, which does duty for a shawl, shook it out, and threw it completely over his head and body, and drew it tight round him. After a short time, as the music continued, he gained courage and put out his head, and at last threw away the cloak and came forward again. By this time his hair was lying flat, and his fear had given place to pleasure. The piccolo at first frightened the monkey, but he soon held out his hand for the instrument, which he was allowed to examine. The flute did not interest him, but the bagpipes—reproduced on the violin—achieved a triumph. He just flattened his nose against the bars, and then scrambling to the center of the cage, turned head over heels, and lastly, sitting down, chucked handfuls of straw in the air and over his head, "smiling," as the keeper said, with delight and approval.

The Fortification of Biserta.

The Vienna *Neue Freie Presse* publishes a leading article entitled "The War Harbor of Biserta," the facts in which are clearly derived from a competent source, while the article itself reads as if intended to prepare public opinion for a diplomatic incident of importance.

I subjoin some passages of this interesting communication:

"To begin with, there is the fact that a first class war harbor is built by France and that the balance of power in the Mediterranean may be modified to the prejudice of the Triple Alliance. The harbor of Biserta is only 18 hours from Malta, and France has evidently been bent on rendering it impregnable. Modern ships of war can reach the Sicilian coast from Biserta in one night.

"After the occupation of Tunis, France formally promised not to transform Biserta into a war harbor, professing to have only commercial objects in view. In 1886 a French military commission inspected the coast, and a little later a plan for the coast defense was elaborated in Paris. The French government then sent engineers to Biserta and secretly took surveys, which were followed by the first diplomatic representations of the British government; yet the French cabinet still denied that it had any evil intentions. It did not feel firmly established in Tunis and did not yet enjoy the patronage of Russia.

"When France began to receive the Czar's favor it proceeded with more assurance. Plans and designs have once more been produced, and the French have begun to build a war harbor of the largest dimensions. The English and Italian remonstrances, and also certain representations from Germany, were met by a flat denial. A period of persistent silence followed, until the change in the situation brought about at Cronstadt emboldened France to contend that by the Bardo treaty it was entitled to build the Biserta harbor. In virtue of that treaty France undertook to provide for the safety of Tunis and the protection of the Bey's dynasty. In vain France was informed that nobody threatened Tunis or the Bey, and that in any case that would not justify the construction of a port which would cost more than 15 million francs. France assumed a more independent and off-hand tone, and the harbor of Biserta is now declared to be a work of national defense, and is destined to be the point of concentration of all the French maritime forces in the great, unavoidable, and decisive struggle for supremacy in the Mediterranean. . . .

"The Italians regard this state of things as most serious, and believe that its gravity will be recognized in England. It is also considered in Berlin that Biserta will be a point of first-rate military importance in case of war with the three Allied Powers. Thus the Tunis ian question seems destined to strengthen and maintain the Triple Alliance, and the fate of Europe may possibly be decided in the Bay of Carthage."—*London Times.*

Silky Paper.

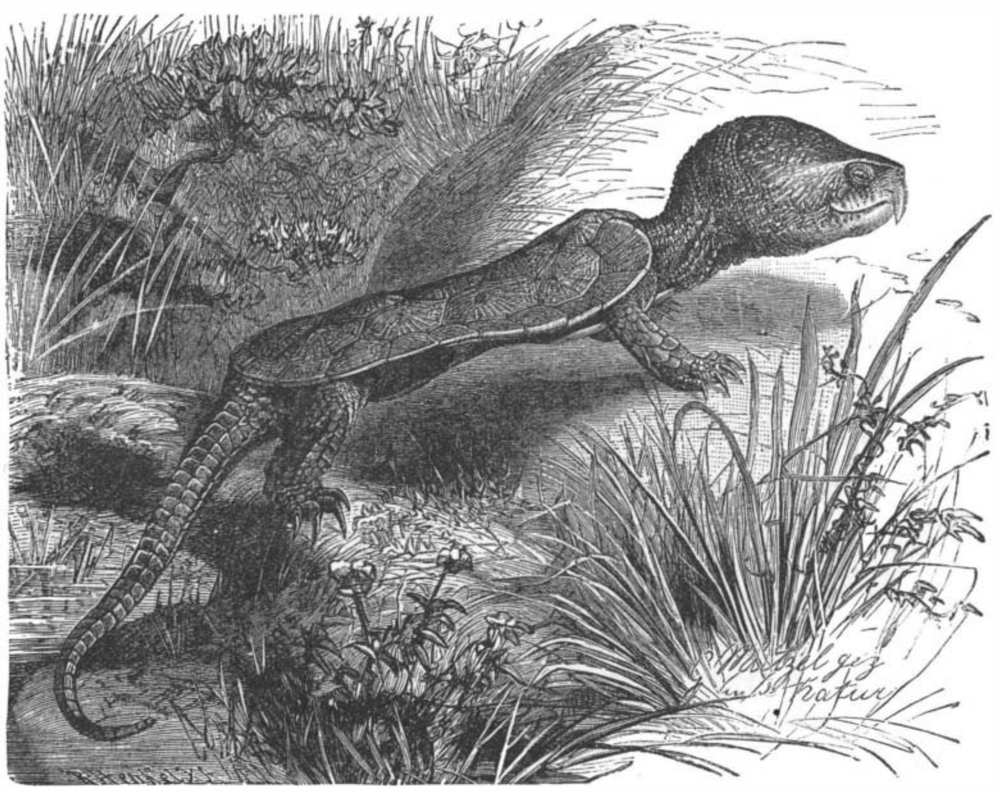
In *L'Industrie Textile* appears a description of a new product capable of being used in the finishing of textile fabrics and of imparting thereto a silky appearance. This product is the mineral antonite which is found very largely in California in masses varying from gray to yellow. This mineral is first treated with hydrochloric acid, which dissolves out all impurities, and then it is well washed with water to free it from acid, after which it is ready for use. The next proceeding is to mix it with glue, starch, and other adhesive bodies, and use it in the ordinary way of finishing materials; the sized fabric can then be sent through the calenders to give it a gloss. The new product may be used with good effect in paper making for imparting a silky appearance.

An Ancient Birdland.

For ages before its occupation by man New Zealand swarmed with great wingless birds, which found here no carnivorous enemies, but an abundance of vegetable food. The moas not only existed in vast numbers and for thousands of years, but had such diversity of form as to embrace no less than seven genera, containing twenty-five species—a remarkable fact which is unparalleled in any other part of the world. The commonest kinds in the North Island were only from two and one-half to four feet high. Those of the South Island were mostly from four to six feet tall, while the giant forms, reaching twelve and thirteen feet, were always rare. Immense deposits of moa bones have been found in localities to which they appear to have been washed from the hills in tertiary times. Skeletons on the surface of the ground, with skin and ligaments still attached, have given the impression that these birds have been exterminated in very recent years, but other facts point to a different conclusion. Tradition seems to show, according to Mr. F. W. Hutton, that the moa became extinct in the North Island soon after the arrival of the Maoris in New Zealand—that is, not less than 400 to 500 years ago—and in the South Island about a hundred years later. The fresh-appearing skin and ligaments are supposed to have been preserved by unusually favorable conditions.

THE GREAT-HEADED TURTLE.

The great-headed turtle (*Platysternum megacephalum*) is an inhabitant of the rivers of Tenasserim, Siam and Burma, but is very rare even there. Its shell is remarkably broad and flat. The entire length of the turtle, when stretched out to its fullest extent, is about 15 inches, one-third of this length covering the head and neck, while the tail is about 7 inches long. The size of the head, compared with that of the body, is very remarkable, there being only a few birds and fishes in which such a lack of proportion is found. Our illustration is from Brehm's "Thierleben."



GREAT-HEADED TURTLE (*Platysternum megacephalum.*)—(One-half natural size.)

A Postal Nickel-in-the-slot Enterprise.

The United States Postage Stamp Delivery Company, of Boston, has placed upon the market a nickel-in-the-slot system of selling postage stamps which has many novel features. It consists of a machine provided with two apertures near the top to receive the nickel. The one on the left is for two cent stamps, while the one at the right is for one cent stamps. When a nickel is dropped in the slot the mechanism releases one of the drawers, which contains a cartouch, or small cylindrical box, inside of which, snugly rolled up, are four cents' worth of stamps, either two twos or four ones, depending upon which side received the nickel. In addition to the four cents in stamps, there is a "coupon draft," which will be received as one cent in ten of the purchase money of any of the articles mentioned in the thirty-two advertisements on the draft, so that if any of the articles named are purchased, the stamps will be furnished without charge.

As an advertising medium, the new system will be very valuable, as the advertiser can judge each day by the number of coupons received whether or not the boxes are a good advertising medium. It may be remarked that only staple articles, or articles which allow a good margin of profit, are expected to be advertised. The boxes are to be placed in a certain district, and the advertiser pays a small sum each month for each box containing his advertisement. It is intended to be largely used by wholesalers, manufacturers, etc., who will receive the drafts from the retailers who sell the goods which they advertise. The whole system appears to be very carefully worked out, and is under the control of an able management, the president being Hon. Carroll D. Wright, United States Commissioner of Labor, and the vice-president Hon. Smith A. Whitfield, First Asssistant Postmaster-General.

The St. Gervais Disaster.

The geologists who have investigated the cause of the great disaster which overwhelmed a part of St. Gervais, Switzerland, with ice and water from the lower part of the Bionassy glacier, have solved the mystery. Up the side of the mountain, at the foot of the steep glacial wall whose lower part broke away, the explorers found in the ice an oval cavern about 130 feet in width and 75 feet in height. In the interior of the cavern was a corridor covered with blocks of ice and leading into a gigantic basin with perpendicular walls of ice. It was 45 feet long, 200 feet wide, and 140 feet high. In this great cavity there had been an intra-glacial lake, of whose existence no one had been aware. The condition of the walls proved that the cavity had been full of water recently.

The existence of this great reservoir of unfrozen water, inclosed on all sides, explains the nature of the immense avalanche that overwhelmed the valley below. The excessive heat for days before the disaster had probably increased the quantity of water in the natural reservoir, and the greater pressure broke the front wall, cracking away the lower part of the glacier, and permitting the immense volume of water to pour down the mountain into the valley below, carrying with it the broken foot of the glacier. The water and ice fell a distance of 2,000 feet down an inclined plane two miles long, and a part of St. Gervais had been overwhelmed almost before any one heard the roar of the approaching deluge.

This is the only accident due to such a remarkable cause ever known in the Alps. It has been followed, however, by a somewhat similar accident at the Misaun glacier, near Pontresina. A considerable part of this short, steep glacier fell, and, although there was no loss of life, the accident draws attention to the fact that all over the Alps climbers have recently noticed a swelling of the upper snows which feed the glaciers. They report that not a few of the glaciers have been impassable without great risk this season, and that the upper edges of the great crevasses have overhung in a remarkable manner. These facts point to an expansion of the upper snow field by great heat, and before the past season was more than half over climbers were warned of this fact, which was doubtless the cause of many avalanches.

A fall of ice from one of the glaciers in the Valley of Visp partly destroyed the village of Tasch, near Zermatt. It carried away nearly a quarter of a mile of the highway. The waters of the Viege torrent, swollen by melting snow from the mountains, attacked the stone bed of the Viege-Zermatt Railroad and destroyed a large section of the line. For a number of days tourists going to Zermatt were transported on mules around the break.

Bread and Yeast.

Put a bushel of flour into a bread trough, make a bay or hole in the center of it, and put in one pint and a half of patent yeast, and the same quantity of lukewarm water; mix this with a portion of the flour to the consistence of rich cream; dust flour over it, cover with a cloth, and allow the sponge to rise. When well risen and light, add two tablespoonfuls of fine salt, and mix all together with sufficient lukewarm water to form a rather stiff dough; cover it again and let it rest for half an hour, then knead it well, and let it stand for another hour, after which make it out into suitable loaves and place them in pans, and bake them on the bottom of a quick oven.

For large bakings, the following is the best method: The usual way is to put the flour into a trough or tub sufficiently large to permit its swelling to three times its original size or bulk; make a deep hole in the middle of the flour; for each half bushel of flour allow a pint of thick, fresh yeast, that is, yeast not frothy; mix it with about a pint of soft, lukewarm water, then gently mix with the yeast and water as much flour as will bring it to the consistence of thick batter; pour this mixture into the hole in the flour and cover it by sprinkling it over with flour; lay over it a flannel cloth, and, in cold weather, place it near the fire. This is called setting the sponge. When the sponge, or this mixture of water, yeast, and flour, has risen enough to crack the dry flour, by which it was covered, sprinkle over the top a quarter of a pound of fine salt, more or less, to suit the taste. After the salt is sprinkled over the sponge, work it with the rest of the flour, and add, from time to time, tepid water till the whole is sufficiently moistened. The degree of moistness, however, which the mixture ought to possess can only be learned by experience. When the water is mixed with the composition then work it well by pushing your fists into it, then rolling it out with your hands, folding it up again, kneading it again with your fists till it is completely mixed and formed into a stiff, tough, smooth substance, which is called dough. Great care must be taken that your dough be not too moist on the one hand, and on the other hand that every particle of flour be thoroughly incorporated. Form your dough into a lump, cover it up again, and keep it warm to rise or ferment. After it has been standing for about twenty or thirty minutes, make the dough into loaves, first having dusted the board or table with flour to prevent sticking. The loaves may be made up in tin moulds, or they may be baked without the use of moulds. The bread will take from an hour and a half to two hours to bake properly.

PATENT YEAST.

Take half a pound of hops and two pailfuls of water; mix and boil these till the liquid is reduced one-half; strain this decoction into a tub, and, when lukewarm, add half a peck of malt to it. In the meantime put the strained-off hops again into two pailfuls of water and boil as before till reduced one-half; strain the liquid while hot into the tub. The heat will not injuriously affect malt previously mixed with tepid water. When the liquor has cooled down to about blood heat, strain off the malt and add to the liquor two quarts of patent yeast set apart from the previous making.—*Confectioners' Journal.*

The Alternating Current Telephone.

In a patent lately issued to Prof. Elihu Thomson, this well known inventor describes a system of telephone in which alternating currents are employed in the primary of the induction coils to which the transmitter is connected instead of continuous currents, as now generally employed. In applying the alternating current for this purpose, Prof. Thomson employs such a low rate of alternation as not seriously to interfere with speech.

The alternations, generated by an alternator, are induced into the subscribers' lines and form the means for transmission from the subscribers' lines to other subscribers' lines, to which they may for the time being be connected through the exchange. The rate of alternations is as low as 32 vibrations per second, and even those below sixteen vibrations per second are available. These rates of vibration or alternation are so low that although the instruments are subjected to them they do not seriously interfere with speech, as the tone they produce is almost inaudible, on account of the small volume of air set in motion by the diaphragms of the instrument.

By means of this system, all local batteries at the subscriber's end of the line are dispensed with, and the system is, as it were, a closed circuit system possessing great flexibility. The system also permits the working of the annunciators at the exchange by the subscriber momentarily opening the line by a switch, or, better, by the simple act of lifting the telephone from the hook, while the replacing of the telephone on the hook again signals the exchange that the use of the line is discontinued. The system also provides circuits, so that there shall not be any circuits actually grounded, as connections to earth through condensers may be made instead of returning through a continuous conductor or a metallic circuit connected to earth, such as is ordinarily employed.

French Exposition of 1900.

The French *Journal Officiel* has published a decree ordering a universal exposition of arts and manufactures, to be opened in Paris May 5, 1900. It would seem from this announcement that France has decided to have a universal exposition every eleven years, for there was one in 1867, 1878, and 1889. The decree states that the exposition of 1900 will be fully representative of the art and philosophy of the nineteenth century.