

### WORLD'S COLUMBIAN EXPOSITION—ENTRANCE TO THE PALACE OF AGRICULTURE BUILDING.

The glory of the Exposition is the Court of Honor, and the glory of the Court of Honor is the Agricultural building. Situated on the south side of the great basin, it extends from the south canal nearly to the Casino, a distance of 800 feet. The building is 500 feet wide, and the cornice line is 65 feet above the grade of the walks. Architecturally the Agricultural building is one of the most successful in the inclosure. The architects were Messrs. McKim, Meade & White, of New York, who are so well known as the architects of the Madison Square Garden, in New York. The building is classical, and of an order designated as heroic by the architects. Pavilions are reared at each corner, and from the center of the building, the center one being 144 feet square. We illustrate one of the corner pavilions surmounted by a dome on which is a group of maidens of heroic size, called the Horoscope Group. These figures are represented as holding aloft a globe about which is a zone with the signs of the zodiac. The figures are made of staff, while the globes are of sheet copper. Each corner pavilion is surmounted by a group representing a distinct race, one the Caucasian, another the Mongolian, the third the Ethiopian, and the fourth the American Indian. Huge Corinthian columns 50 feet high and 5 feet in diameter support the pediment over the porticos. The dome over the main entrance, which is one hundred feet in diameter, is surmounted by St. Gaudens' statue of Diana, formerly in New York. On each corner pavilion are two reproductions of what are called the Four Seasons, making altogether eight of these groups. This group consists of four female figures representing the four seasons of the year, spring, summer, autumn, and winter. They are set back to back with their arms outstretched for sheaves of wheat extended above their heads.

We have already illustrated the large cattle group in our issue of April 29. From what has been said it will be seen that the decorative scheme of the Agricultural building takes its motive from agriculture, and primarily American agriculture; this is no less true when the minor decorative work is considered, maize, the potato, tobacco, etc., being freely used as decorative motives with excellent effect. The painted decoration in the entrance porticos is the work of Mr. George W. Maynard, of New York, who chose the Pompeian style of mural decoration as the best one adapted to the severely classic outlines of the Agricultural building. Mythological deities and figures representing "Abundance," "Fertility," etc., were chosen. The little bit of color adds greatly to the success of the general effect. We give some details of the other pieces of sculpture on this beautiful building, the description being taken from a former issue.

On the exterior walls of the building, in strong relief, are fifty-four single figures of the Angel of Abundance holding a cornucopia which is overflowing with the fruits of the harvest. These figures are clothed in loose flowing robes and are classical like the others. Between the springs of the arches of the north, east, and west sides of the building are twenty-two more single figures in relief representing a female classically clothed, holding in her hands the signs of the zodiac. On the east front there are two spandrels, also two on the west and one on the north side. Four of these are the same. The two on the west side are immediately under the Horoscope Group and represent a pastoral scene of a shepherd with a crook in his hand, sitting on the right with two ewes and a lamb. The other spandrel represents the triumph of Ceres, and is on the north front. Ceres, the central figure, is represented as standing erect, holding a sheaf of wheat in her left hand and a shepherd's crook in her right. Further down on the pediment are other reliefs. On the left is a reproduction of Flora, Bacchus, and other mythological deities seated in a chariot drawn by two tigers. Over against this relief on the right hand is a figure of Mercury and pastoral deities in a car drawn by two dragons. The statuary is all the work of William Philip Martini, of New York, with the exception of Diana, which is the work of Mr. Augustus St. Gaudens.

The total cost of the building was \$618,000, including the annex, which measures 312 by 550 feet.

In the interior thirty-seven States of the Union and thirty-five foreign nations exhibit agricultural products. Here may be found models of breweries with a capacity of one barrel of beer a day, exhibits of corn, maize, wheat and the complicated machinery used in their cultivation. Preserved meats, Apollinaris water, dairy products, sugar, bread, tea, coffee, spices, vegetable fibers follow one another in quick succession as the visitor hurriedly passes down the long avenues. Some of the oriental countries make choice exhibits, and here may be seen some of the possible uses of the bamboo.

In the galleries are attractive exhibits of well known food products, Quaker oats, Kingsford's starch and Maillard's chocolate and a thousand and one food preparations, with which we have been familiar from childhood, stare us in the face.

The exhibits are shown in a choice setting, and the marvelous beauty of the white building makes a lasting impression upon the memory.

### Argentine or Silver Paper.

A substance known as argentine has been introduced in Germany for making the so-called silver paper, which is used instead of tinfoil as a packing material. It is a finely-divided form of metallic tin, also known as tin dust, of such a texture as to become an extremely fine powder, which must be perfectly uniform in grain, of a bright metallic gray tint, and entirely free from crystalline particles. The author was for some time in charge of a manufactory of this article, and introduced some modifications in the process, which are described. The raw materials of the manufacture are tin, hydrochloric acid, and zinc. The first may be used in the form of block or grain tin, but generally waste materials, such as bearing metal turnings, which are obtained from railway repairing shops in large quantity, are preferred. These are very variable in composition, including both white and red metal, with the proportion of tin varying from 27.6 to 74.5 per cent. The solution is effected by boiling the alloys with hydrochloric acid in large copper vessels, taking care to keep the stanniferous material in large excess, under which condition the copper is not attacked, while the greater part of the tin dissolves, lead, copper, and antimony remaining wholly or partially undissolved. The solution is filtered through a layer of sand in a hard-wood tub with a double bottom, where the lead chloride contained in the hot liquor crystallizes out on cooling. The residues are passed on to another establishment, to be used in making copper and antimony preparations. The purified solution, consisting essentially of stannous chloride, with traces of antimony, lead, and iron, having an average density of 40° B., corresponding to about 23.5 per cent of tin, is diluted from one to two hundred times its volume of water, and transferred to large vats in which plates of zinc are suspended, when, if all conditions are right, the tin precipitates as a uniform gray mass, rendered spongy by the simultaneous evolution of hydrogen, falling, when dried and rubbed through a sieve, to a fine dust.

The precipitate is removed every day, fresh liquor is added, and the process is renewed until the zinc chloride solution remaining has reached a strength of 20° to 25° B., when it is removed and concentrated to 50°, corresponding to a strength of 52 per cent of chloride of zinc. This is readily sold, as it is extensively used for preserving railway sleepers. The finished product should be as nearly as possible pure tin. An average sample analyzed by the author contained: Hygroscopic water, 0.83 per cent; lead, 0.6 per cent; zinc, 0.83 per cent; the remainder being tin, with small traces of iron, chlorine, and antimony.

As the silver paper is used in wrapping up provisions, the tin dust used in its preparation must not, according to the sanitary laws of the German empire, contain more than 1 per cent of lead.

In the year 1890 the price realized varied from 77. to 77. 10s. per cwt.

Formerly silver paper was made by covering ordinary white paper with a priming of white lead and size, upon which either silver leaf or tinfoil was cemented. At present this has been almost entirely replaced by argentine, which is made to adhere to the paper by the use of so-called wax solutions, prepared by methods which are kept secret. According to the author, the methods are as follows:

In the first, 4 kilos. of wax and  $\frac{3}{4}$  kilo. of potash are boiled with 50 kilos. of water, and the melting fluid so produced is stiffened to a thick paste by stirring the tin precipitate into it.

In the second, 75 liters of freshly made 4 per cent starch solution are mixed with 750 grms. of a wax solution prepared from 5 lb. of wax and  $1\frac{1}{2}$  lb. of potash dissolved in hot water, and 25 kilos. of argentine are added.

The paste so obtained is printed by rolls on to paper, which dries to a dull gray tone, but becomes bright when burnished by passing through hot calender rollers, when it exactly resembles tin foil.

### Soap Bubble Solution.

According to a communication recently made to the Academy of Sciences the following solution affords very thin and permanent bubbles:

Yellow resin.....	10 grammes.
Carbonate of potash.....	10 "
Water.....	100 c. c.

Boil until completely dissolved, and before use dilute the solution with four times its volume of water. It is somewhat difficult to float soap bubbles upon carbon dioxide, because, if you managed, after a score of trials, to free your bubble from the pipe on which you blew it, the bubble usually bursts the moment it touches your heavy gas. Mr. Newth lets us into the secret in his recent book. You must remove every trace of hydrochloric acid, which is carried over with the gas, by washing, the presence of this acid being fatal to the life of a soap bubble.

### Correspondence.

#### Color Blindness at the Miller School.

To the Editor of the Scientific American:

A report on the color blindness found in this school may be of interest, from the fact that, in accordance with the will of the founder, Samuel Miller, none of our pupils are of wealthy families, while all are from one county, Albemarle.

About two months ago I examined the pupils, some two hundred and sixty, of this school for color blindness, using Dr. Oliver's method, a modification of that of Holmgren. There were five test skeins of worsted—red, rose, yellow, blue, and green—each with two skeins of darker shade and two of lighter tint. Besides these there were a large number of confusion skeins of different colors, shades, and tints.

The test was made in the usual way, by matching colors. Those who matched the colors correctly, red with red, green with green, etc., as a matter of course, were considered all right, while those who matched such colors as red and green together were considered color blind.

Of the two hundred and sixty persons, students with but few exceptions, examined, one hundred were girls and one hundred and sixty were boys. Not one instance of color blindness was found among the girls, while eight cases of very decided color blindness were found among the boys. Seven of these were cases of red blindness, being unable to distinguish between the so-called rose and green of the same shade. One boy seemed unable to distinguish between any two colors of the same shade, even matching rose, green, and yellow together.

It is stated by high authority that only one of a thousand women will be found color blind, while one of every twenty men has this defect. The above report, therefore, while interesting, should not be a surprise.

W. J. HUMPHREYS, Professor of Physics.  
The Miller Manual Labor School of Albemarle,  
Crozet, Va., August 2, 1893.

#### A Simple Optical Photometer.

A simple optical photometer, serving also to measure the degree of visual acuity, has been devised by Dr. Simonoff. A book of twenty-four pages is arranged; the first being of a clear gray tint, the second of double the intensity, and so on to the last, the color of which is nearly black—being twenty-four times the intensity of the first. On every page are printed a few phrases in black letters of different sizes. The amount of illumination available in a badly-lit apartment may be estimated by turning over the pages of this little book, held at a distance of about a foot from the eyes, until one can no longer read the line of letters of a selected size. With good illumination, the characters on the twentieth or even the twenty-fourth page may be read; but with poorer light legibility ceases at the tenth, or twelfth, or fifteenth page. The appliance is meant for indoor use exclusively, and must, of course, be employed with intelligent reference to the power of the eyes of persons making the test. But it is said to give fairly reliable comparative indications of the degree of lighting in a building; and it is likely to be useful in ascertaining the sufficiency of the lighting of class-rooms and public buildings intended to be used for educational purposes.

#### The Modern Steamer.

In order to appreciate the great development of the steamship, which borders on the marvelous, the *Polytechnic* says, we have only to make a few figures as to the possibility of propelling a vessel with oars at the calculated speed of the *Campania*. If it were possible to place 300 oars on each side, making 600 oars altogether, each worked by three men, there would be 1,800 men at work at one time. As they could not work continuously for twenty-four hours, but only for a total of eight hours each man, divided into four-hour watches, it would be necessary to have a crew of 5,400 men alone to man the oars. If six men could develop one horse power, the total horse power developed by the 600 oars handled by 1,800 men would be but 300, as against 30,000 in the *Campania*, or the same power would require the employment of 180,000 oars and a crew of 558,000 men to manipulate them. The first steamer built by the Cunard Company was the *Britannia*, which was launched February 5, 1840, or fifty-three years ago. She was built of wood, by Robert Duncan, at Port Glasgow, her length being 207 feet; breadth, 34½ feet; depth, 22½ feet; tonnage, 1,156; passengers carried, 115; cargo, 224 tons. The engines, by Robert Napier, were side levers, with two cylinders, 72 inches diameter by 82 inches stroke of piston, driving paddle wheels 28½ feet diameter. Steam of 20 pounds pressure was provided by four fire boilers, with twelve furnaces, which consumed 38 tons of coal per diem. The speed of the vessel was 8½ knots, with the engine developing 710 indicated horse power; coal consumption, over 6 pounds per indicated horse power: time in making the voyage, 14 days.

**Man in South America.**

There is no part of the world that offers a more curious subject of speculation as to its future than the continent of South America, as was well set forth in an address before the American Geographical Society, by its president, Mr. Gardiner G. Hubbard.

That the Amazon river system alone drains a basin of fertile land basking under a climate of perpetual summer, greater in area than the whole of Europe, is an astounding fact in itself. This vast territory is practically uninhabited. Its aboriginal population is disappearing, or has disappeared, and the whites, who in sparse number take their place, scarcely pretend to come with the expectation of remaining. There are tracts as large as the whole of France of which we know less than of any equal area on the globe. Tribes of men are living there who are yet absolutely in the stone age, and who, even by barter or distant rumor, never heard of the European race or the use of metals.

The question up to which Mr. Hubbard leads his reader is second in importance to none in anthropology—that of acclimation. Is it possible for the white race, when it shall be endowed with all the resources of art and science which it is soon to have in its grasp, successfully to fight against the terrible odds of a tropical climate? He quotes in his favor the words of the historian, Buckle, and the naturalist, Bates; he might have added others of weight; but it cannot be doubted that most of the medical observers who have devoted themselves to this vast inquiry lean to the opinion that never will the white race flourish under tropical skies.—*Science*.

**Dr. Nansen's Polar Expedition.**

After three years' preparation the Polar expedition under Dr. Fridtjof Nansen has finally sailed from Christiania, Norway, for the North in the good ship *Fram* (*Advance*), the first vessel that has been especially designed and constructed for Arctic research.

The party consists of twelve men, including Dr. Fridtjof Nansen, as leader of the expedition; Lieutenant Scott Hansen, R. N., as scientific member; and Henrik Blessing, M. D., as surgeon and botanist.

The expedition sails in the vessel *Fram*, which is a model of strength, but she is a trifle too small for the enormous amount of stores with which she has been loaded and which have brought her so down in the water, that the ice sheathing has had to be heightened, while giving her hull the appearance of something between a Dutch koff and a Thames barge. The accommodation on board seems too cramped for twelve men. The main cabin or saloon measures but 6 ft. 3 in. in height, 13½ ft. in length, 16 ft. in width at the lower, and 11 ft. at the upper end, while the six sleeping cabins off it are diminutive. In the deck house are a small chart room and Dr. Nansen's study, both small in proportion, and on the whole it gives one the idea of being a neat little doll's house for twelve gigantic puppets. The stove in the saloon consists of an iron case containing numerous copper tubes, and is heated by paraffin lamps. Lighting will be electric or by means of lamps. The dynamo is worked either by steam, wind or hand power. A large windmill will be erected on deck, where there is also a winch which can be worked by four or more men, and, in order to give the hands sufficient exercise during the darkness, the latter will be daily resorted to in the winter months. The caboose, or kitchen, contains an ordinary cooking range, and also a very compact and handy copper stove heated by lamps, the gift of a London firm. The engines are triple expansion, and to obtain a speed of seven knots consume three and a half tons of coal a day, of which she carries a supply of about 350 tons, calculated for 200 days' continuous steaming at about four to five knots speed. The furnaces are constructed to burn petroleum, or even blubber, and under petroleum the vessel obtained on a trial trip the same speed as with coal.

The provisions are of various kinds, quantities being specially prepared on scientific principles, to give the men's stomachs the least possible expansion with the greatest possible quantity of nutriment. Clothing is of many sorts, from woolen jerseys and underclothing to fur outer garments and waterproof British linen. The sledges differ considerably from those taken by Astrup for the Peary expedition, being much lighter, from 9 ft. to 10 ft. in length, 1½ ft. in breadth, and about 6 in. in height. They are said, however, to be wonderfully tough, and capable of bearing heavy loads, and most are shod with German silver to protect the wood. Numerous Norwegian "ski" are also taken. The *Fram* carries seven large boats, including a naphtha cutter, of the ordinary sealing or whaling type, and will be used for the chase of walrus and seals and other sporting purposes, while two will be specially fitted for escape should any accident happen to the *Fram* herself.

Last summer Dr. Nansen changed his plans, and announced his intention of proceeding, not via Behring Straits, but round the Norwegian and Russian coasts, to the spot north of the Liakov Islands which will be the starting point for the journey on the ice to the Pole. By adopting this latter route the sudden

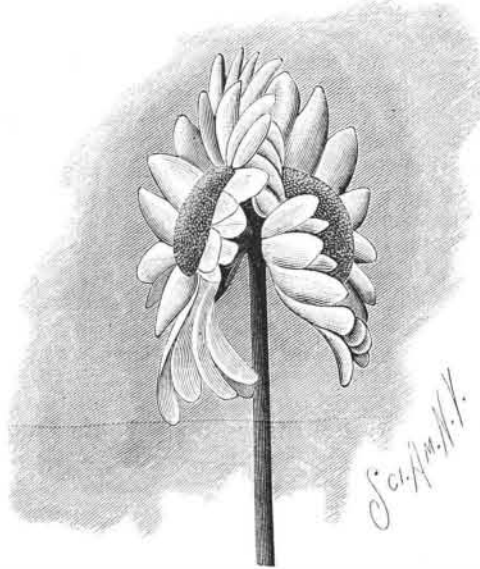
plunge into the glacial stream is avoided, but the chances of not reaching his destination at an early date are very considerably increased, as the ice in the Kara Sea may be impassable, and but very little is known of its conditions on the Siberian coast.—*London Daily Graphic*.

**A TWIN DAISY.**

Scores of adulatory verse have been written by poets of "the fields white-decked with nodding daisies." Gross dozens of earthen flower holders have been filled, by blooming maidens, with daisies for conspicuous ornamentation. The more practical husbandman, however, utters imprecations till the atmosphere takes on a cerulean hue as he speaks of those pests of his field, "them common daisies."

A very uncommon one, however, is the subject of our illustration. Not for its economic or pictorial aspect do we show this strange departure from the regular growth, but on account, first, of its oddity, a genuine twin daisy; and second, because if one daisy is good, two on the same stalk must be better.

Daisies were not made alone for poets, maidens, or farmers. There is our old grandmother, bless her soul! when we were ourselves so enfeebled by weakness as to have copious night-sweats, such as fairly saturated the bedding with our oozing strength, she gathered some of these charming flowers and decorated the interior of the tin teapot with their beauty—practically steeped them into a tea and told us to drink freely of it, when cold. She knew better than farmer or poet that there were other virtues than verse and curse in this little creation of God. It stopped our night-sweats immediately, and

**A TWIN DAISY.**

in our builded-up strength we have thought possibly it were better to have two daisies grow where but one grew before.

**Steel for a Cent a Pound.**

In a recent interview with the reporter of one of the Pittsburg papers, Andrew Carnegie, when asked about the condition of the iron business, replied: "Well, I do not need to say anything about that; it speaks for itself. One pound of steel for one cent! The robber baron has ceased to rob and is now being robbed. The eighth wonder of the world is this: 2 pounds of iron ore, purchased on the shores of Lake Superior and transported to Pittsburg; 2 pounds of coal, mined in Connellsville and manufactured into 1¼ pounds of coke and brought to Pittsburg; one-half pound of limestone mined east of the Alleghenies and brought to Pittsburg; a little manganese ore mined in Virginia and brought to Pittsburg; and these 4½ pounds of material manufactured into one pound of solid steel and sold for one cent! That's all that need be said about the steel business. The capacity of the country to manufacture is beyond its wants. Some furnaces and mills must stop, others must restrict production, and, until that is done, we must expect the continuance of low prices. It is the same all over the world. England is even worse than we are, but she has endured the depression so long that she has closed many of her works. The longer all parties continue to run, the lower prices will become, and the more disastrous the stop will be to some of these when the end comes."

**The Latest Form of Trolley.**

According to the *Baltimore Sun*, the novel sight of a man taking the place of the trolley rod on an electric car was recently seen on the Lake Roland Elevated Railroad. The trolley on one of the large electric cars was caught in a wire, and the entire trolley apparatus was torn off, falling to the street. The accident happened at a time when the traffic was heavy, and it was necessary to prevent a block. A linesman was equal to the occasion. He procured a piece of insulated wire, and, after stripping each end of the insulating material, connected one end through the car roof and, standing

on the top of the car, held the other end against the wire. A connection being thus made, the car was run over the elevated structure to the car shed without accident or delay to the other cars.

**Spiders and their Foes.**

The spider, rejoicing over the captives ensnared in his silken meshes, and binding them securely in his larder as stores against hungry days, lives in continual danger of a righteous retribution, which awaits him at the hands of many foes; but the ghastliest of all is the ichneumon fly, which does not kill its victim, but merely paralyzes it and renders it a totally passive agent incapable of offering the smallest resistance to the cruel power which enthalls it.

I believe that the English representative of this family makes its nest underground, so it generally escapes observation; but the ichneumon fly of Ceylon works in full light of the sun, where all who care to watch its domestic habits can do so.

It is a green insect, in form resembling a wasp, with a marvelously thin waist. It makes its nest of well-worked clay, and then goes out on a hunting expedition. Its victims are invariably spiders of various kinds, but all are subject to the same mode of treatment. A scientific sting injects some poison which effectually paralyzes the luckless spider, who is then carried off to the nest and there fastened with a dab of moist clay. Another and another victim is brought to this chamber of horrors. Then the prescient mother ichneumon fly proceeds to deposit her eggs, one in the body of each spider, which can just move its legs in a vague, aimless manner, but can offer no resistance.

This done, the fly returns to her work as a mason. She prepares more clay and builds up the entrance to this ghastly cell. Then she commences a new cell, which she furnishes in like manner, and closes; then she adds yet another cell, and so proceeds till her store of eggs are all provided for, and, her task in life being accomplished, she dies, leaving her evil brood to hatch at leisure.

In due time these horrid little maggots come to life and find themselves cradled in a larder of fresh meat. Each poor spider is still alive, and his juices afford nutriment for the ichneumon grub, till it is ready to pass into its chrysalis stage, thence to emerge as a winged fly, fully prepared to carry out the traditions of its ancestors with regard to spiders, and to fulfill the purpose for which they have been created, according to ichneumon belief.

In California the spiders live in dread of a certain yellow-winged dragon fly, which darts upon them, stabs them, and devours them. One wary spider, which is there called tarantula, or, more properly, the trap-door spider, constructs for itself a house of refuge, where it retreats in the hour of danger. It is a wonderfully ingenious architect, and displays amazing skill and patience in contriving and constructing its home, which in truth is a fortress, with a strong door to keep out all besiegers.

The nest is a little well of clay sunk in some earthy bank, just large enough to admit an average-sized human thumb. The interior is smoothly polished, but this so-called tarantula is not content with bare plastered walls. She is a diligent worker, ever weaving dainty fabrics; so she lines her home with a double curtain—a hanging of coarse spider cloth next the wall, and over that a rich white satin material, smooth and glossy.

At the upper end of the well-like nest there is a circular door, fastened with a sort of hinge. It opens outward, so that when the spider goes out, it falls and closes of its own accord, and no foe would ever notice the little disk in the earthen bank, which is the only trace of the tarantula's home. But to make assurance doubly sure, the wary spider provides means to secure it on the inside. At the side furthest from the hinge it leaves several small holes in the disk, and by clinging to these with its claws it keeps the door tightly closed from the inside, so that no enemy can enter.

The door is in itself a marvelous contrivance, and a monument of patient ingenuity. Though barely the eighth of an inch in thickness, it is composed of thirty triple layers, each consisting of a coating of clay, lined with two ply of spider cloth similar to the tapestry within the nest. These ninety layers are all fastened together, making a solid door, which is largest on the outside, and fits into a groove, so that it closes quite tight. I suppose sufficient air for breathing purposes comes in at the keyholes.

The yellow-winged dragon fly, against which the spider defends itself so securely, even endeavors to scratch open the closed door behind which its prey has taken refuge. But once within that portal, the fugitive is safe from winged foes. His chief danger then lies from the keen-eyed Indians, who know what a ready sale these curious silk-lined clay nets command among the pale-faced travelers from far countries, many of whom have already obtained very similar spider nests from the shores of the Riviera, and are anxious to compare the spider architecture of the Old World and the New.—*C. F. Gordon-Cumming in Leisure Hour*.