A Day in Machinery Hall.—This building, which with its annex covers twenty acres, gives at once the impression of a busy place. Whirring wheels, clanking drills, swift shuttles, shafting in every possible position, mingle with undistinguishable sounds to make most trying discords. The exhibits are, for the most part, separated only by low railings; this is necessary for good light, but contributes to the sense of hopeless distraction which the visitor at first has. The main structure with its three arched trusses is like a triple railway train house. Traveling cranes, used in the construction of the building, are fitted with platforms and carry visitors from one end to the other, at a height, I should judge, about midway between the floor and roof. From this vantage ground, a comprehensive view of the whole may be had.

Along the central aisles, looms for cotton, wool and silk weaving are prominent. Perhaps the whole Fair does not offer a single stronger contrast than that between the Jacquard looms which produce pictures in silk—the Signing of the Declaration of Independence and others—and the little hand looms at which women in the Indian Encampment are weaving.

But the machinery of which I write stands off the main thoroughfares, in the annex and along the outer aisles of the hall, in places too obscure to satisfy some of the exhibitors. The men in charge I found uniformly polite, and so ready to give information and documents about the exhibits that I was constantly tempted to linger longer than my time allowed.

Near the north entrance the problem of ventilation has a solution offered in the exhaust fan manufactured by the Andrews & Johnson Co., of 241-247 South Jefferson Street, Chicago. The fan is formed of six curved blades, shaped like oars and inclosed in a round casing; it is attached to a compact Johnson high speed engine. The fan exhausters vary in size from a diameter of 18 inches to 108 inches. The advantage which this has over other exhausters, as stated by the manufacturers are: "(1) The small power required to run it and its safety. The fan being inclosed by a framework, the arms of which are made of the best malleable iron, the possibilities of an accident are reduced to a minimum. (2) Its convenience in application. Owing to peculiar construction of the frame it can be placed at either end or in the center of a pipe, in a wall, window or door, and can be run horizontally or perpendicularly, as circumstances may require. (3) It is *noiseless*, and offers when in motion no obstruction to the light."

The Johnson engines, to which the fans shown in operation are attached, are described by their makers as "noiseless, durable and effective, self-oiling and very powerful, closed tight and occupying very little space."

It is claimed that these fans can be used to advantage in all manufactories, school houses, mines, grain elevators, foundries, in fact, in any building where there is difficulty in removing impure air, foul odors, or dust.

A fan of 36 inches diameter, with an engine of from ¾ to 2 horse power, makes from 400 to 900 revolutions a minute and exhausts from 12,000 to 26,000 cubic feet of air a minute. The apparatus has been in use for seven years, and has been placed in such buildings in Chicago as the Meriden Britannia Co., 147 State Street; Manual Training School, Monroe Street; *Inter-Ocean* press room; Carson, Pirie, Scott & Co., dry goods store, and hundreds of other buildings in the city and in towns of the Northwest. From many sources most satisfactory testimonials to the efficiency of the apparatus are printed in the pamphlet which the firm gives to those interested.

In the English section the exhibit of the Economic Smokeless Fire Co. deserves notice. It shows ranges, stoves, and other heating apparatus to which Leggott & Marsh's patents for consuming smoke are applied. The invention consists in having a "baffle" in an inclosed fire chamber, dividing the chamber nearly from top to bottom. Adjustable "louvres," which can be opened or closed, are placed in the front of the chamber or grate. "Air is admitted to the fire mainly at the front, the fuel being fed on top of the fire. The draught being downward, the products of combustion are drawn through the fire, where the smoke-producing agents are consumed, the resultants together with the heat passing under the 'baffle' into a hot air chamber behind it and thence into the chamber." The "louvres" are moved by levers on the outside. The stoves or heaters are adapted to the use of the cheapest grades of coal. The *Lancet* last year appointed a commissioner to investigate the apparatus, and the following analysis of the soot from a chimney where it had been used is his:

Moisture	0·70 per cent.
Carbon	7·20 "
Hydrogen	0·23 "
Mineral matter	89·15 "
Nitrogen (partly in ammonia) and oxygen	3·42 "

The analysis of soot of a chimney where an ordinary range was used, he found as follows:

Moisture	6·68 per cent.
Carbon	76·76 "
Mineral matter	16·68 "
Nitrogen (ammonia)	6·36 "

There are 1,500 of these heaters in use in Great Britain, and from every quarter comes evidence of satisfaction with their working. Mr. W. T. Stead, editor of the *Review of Reviews*, is so well known in this country that his testimony is especially worth having. He says: "If this patent acts as satisfactorily when applied to other fires as it has done when applied to my own kitchen range, the days of fog are numbered. It is simple, efficient, and as economical as a kitchen range, and it consumes its own smoke. The principle of this stove is very simple; it consists in having the chimney at the bottom of the fire instead of the top. The products of combustion must pass through the hottest part of the fire, and in this way the smoke is consumed."

Although our heating appliances are, in general, superior to those which have in years past been made in England, with the best of ours there is so much waste and damage from the unconsumed carbon that it is to be hoped that these stoves will have fair trial here.

The Moore Carving Machine Company are in Section 14. Their first patents were taken out in 1888, and now there are 400 of their machines in use. They are made in Minneapolis. From a pattern cut by hand in wood, or from a plaster cast of such a carving, four exact copies may be cut at a time on this simple apparatus. To the novice it seems like magic. The machine requires only six feet of floor space, as the five tables upon which the work is done are arranged one above the other. The hand carving or cast rests upon the middle table. The operator looks at that, and works one or both of the cutter heads above and below him. These cutter heads have what is called a hand movement, and hold bits of various sizes. The carvings may be made in oak or mahogany as well as soft wood, and in a piece 30 inches wide, 6½ feet long and 2 feet thick I saw beautiful heads and groups of children from the antique which were cut on the machine. The pattern in hard maple, made by an artist, cost $100; the reproductions on the machine cost $1.25. They are improved by having a hand carver go over them with his tool to smooth them and work up the delicate details.

Two hundred of these machines are now used by manufacturers of furniture, pianos, etc. The machine is also adapted to other work, such as mortising, grooving, paneling, etc.

Another invention for bringing beautiful woodwork within the reach of people in moderate circumstances is a new one by W. W. Grier, of Hulton, Pa.

He calls his process *ingraining*. His apparatus consists of a hollow cylinder 10½ feet in circumference, to which the grain of a piece of oak of the width of the cylinder has been transferred. This grain is covered with a soft cement, which sinks into the depressions, and in these about 200,000 bits of metal like type are set. A small, smooth steel cylinder adjustable to different heights is placed above this. Between the two cylinders, both revolving, a piece of birch, poplar, bass, spruce or maple may be passed. It comes out with the grain of the oak transferred to it. It is then passed between two other steel cylinders, one revolving in a trough containing a liquid consisting of oil, coloring matter and another ingredient which is the inventor's secret, used as a "filler." The wood is afterward polished and varnished and looks like choice quartered oak. It can be sold at 40 per cent less.

Mr. Grier is also the inventor of what he calls the *ideal* door, which, he says, is "unwarpable, untwistable and unshrinkable."

He exhibits doors of this kind and also sawed sections of them, showing that they are five-play where most strength is needed. They are veneered with the ingrained lumber, and are 50 per cent cheaper than the ordinary oak door made with mortise and tenon. Thousands of acres of basswood in Michigan and Wisconsin, some of the trees five feet or more in diameter, can by this process be changed into the semblance of hard wood.

Across the aisle from this exhibit, which I should have said is at Column E. F. 53, in the annex to Machinery Hall, is that of the Norton Emery Wheel Company, of Worcester, Mass. In a case specimens of corundum are displayed; yellow from Georgia, dark red from the island of Naxos, shades from gray to black from North Carolina. All of these kinds are used for the wheels, large and small, which the company manufacture. The chief source of the supply of emery is Chester, Mass.

The most important exhibit of the annex is the paper mill. To Mr. J. F. Waggoner, the publisher of the *Paper Trade*, is due the idea of putting up the mill, and Mr. H. A. Frambach, of Kaukauna, Wis., who owns several paper mills in that place, superintended its construction. Forty-five manufacturers have contributed machinery for the plant, and it is supposed to comprise the very best that has been made for the manufacture of paper from wood pulp.*

The raw material used is of two kinds: 15 per cent is poplar prepared by the sulphite process and 85 per cent is spruce. It is brought by the car load to the building, dropped upon a conveyer, built by the Jeffrey Manufacturing Company, of Columbus, O., and carried to a storeroom under the mill. From this roome it is brought through a trap door to the beaters. There are two of these machines in use, both of new design, built by the Downingtown Manufacturing Company, of Downingtown, Pa. A 1,000 pound beater is placed on its edge. "A 48 × 48 inch roll in the middle of the engine acts simultaneously upon two bed plates, one at the top, the other at the bottom of the roll. The bottom bed plate is fixed, as in the ordinary engine, and the roll is hung upon very heavy arms at each side, with suitable means of adjusting its height to the bottom bed plate. Attached to the pillars which carry these arms are two others, which support the top bed plate." The roll is adjusted to the bottom bed plate, in setting the machine, and the top bed plate is adjusted to the roll. The roll is kept exactly midway between the two plates; a hand wheel moves roll and top bed plate at the same time. The engine is of iron and very compact.

The water used is first purified by passing through a gravity filter made by the O. H. Jewell Filter Company, and is pumped into the engines by a Gould's triplex pump. The stuff chests measure 10 × 12 feet and have cypress tanks. They were built by the Williams Manufacturing Co., of Kalamazoo, Mich. Their capacity is 2,000 pounds. The agitators which they contain were made by Richard Smith, of Atlantic, Mass. A reversal of the turbine principle is used in them: a single casting on a vertical shaft, and carrying buckets, keeps the stuff constantly and evenly in motion.

A rotary stuff pump made by the Morris Machine Works carries the stuff to a Marshall refining engine. From the other stuff chest, the stuff is carried to a mixing box, by a Gould triplex pump. From the box, the stuff goes to a screen made after their noiseless rocker pattern by the Valley Iron Works, of Appleton, Wis., and to another made by Baker & Shevlin, of Saratoga, N. Y., according to a new design called the bellows screen. The two screens are thus brought into the closest competition. The screen plates, nine in number, with 0·016 inch openings, are made by the Western Screen Plate Works, of Appleton, Wis. The Beloit Iron Works furnished the machine, and it has some absolutely new features. The Fourdrinier with 50 rolls and 50 foot wire is 112 inches wide.

The deckle frame, slice and pulleys of aluminum, is so light that two men can raise it from the machine. The rubber-covered couch and press rolls were supplied by the Revere Rubber Company, of Boston.

The driers, seventeen in number, are in double stack, nine below and eight above.

Radiation of heat is prevented by having the ends covered with iron and an air space left between the jackets and heads. The first roll is a 24 inch drier, so that the drying begins as soon as possible. The oiling is done after an approved automatic method.

The first calender is a five-roll stack and it is followed by a nine-roll super-calender, with rolls hung in boxes which slide on the frame, leaving one side perfectly free to remove or insert rolls. The calenders were made by the Farrell Foundry and Machine Company, of Ansonia, Conn.

The reel has six rolls; the slitter, which has a rubber feed roll, was made by the Bess Machine Company, of Hamilton, Ohio, and the winder is a Manning. Convenient accessories to a model mill have been furnished by a dozen other firms.

The product, about 125 tons a month, is smooth, white close paper, and is taken by the *Inter-Ocean*.

Mr. Hillis, the gentleman whose chief business is to show the working of the plant to interested visitors, is most explicit in his explanations, and the men who are engaged in operating the machinery answer questions with exemplary patience. It is certainly a most valuable exhibit, not only for paper makers but for people in general, who cannot fail to learn something from an object lesson which contains so much.

A beautiful feature of Machinery Hall is a great basin into which streams of water are pumped at many angles, some rising to considerable height. It is in fact an exhibit of pumps and hose, but has all the refreshing effect of a fountain.

Near this are several exhibits of steel tools. Here are great cases of saws—band saws, from those of a

(*Continued on page 230.*)

* The details about the mill and the quotations which I make are from a copy of the *Paper Trade*, in which it is minutely described.

Notes from the World's Columbian Exposition.

(*Continued from page 227.*)

quarter of an inch wide to those eight inches wide, arranged on great pillars covered with velvet; circular saws of many sizes, some of possibly five feet in diameter, are revolving. A person who has not seen them will hardly believe it, but they are really beautiful.

Henry Disston & Son's File Company, of Philadelphia, show a great variety; among them are band saws of aluminum steel.

The exhibit of E. C. Atkins & Company, of Indianapolis, Ind., has many interesting features. The arrangement of the saws is perhaps more artistic than any of the others. The five great columns in their case all turn the twelve inch band saw, which goes around them all, apparently serving as a belt. Each column carries a different kind of saw; the entire length of those on one is 912 feet.

They have an interesting relic in the shape of a mulay saw made fifty years ago by the firm. It was used in a mill in Wisconsin, until it was burned; last winter a new mill was built, and the old mulay, after having been buried twenty years, was brought to light, rusty but intact. It is six feet long and has seventeen teeth. Quite a contrast between this and the sixteen foot saw made by this firm on purpose to bring down the big tree which the State of Washington has in its building!

The most artistic feature of this rare exhibit is an American flag with its stripes composed of alternate copper and steel saws and its stars of small circular saws on a blue steel field.

These saws make one determined to be at the saw mill, just beyond Machinery Hall, at 2 o'clock, when it is in operation. I was just too late to see the day's work done, but the foreman was kind enough to show me the apparatus and to give me some valuable facts. The mill was built by the Edward P. Allis Co., of Milwaukee, after their most approved methods of band mill making. The great band saw was made at Beaver Falls, Pa., and is 45 feet long and 12 inches wide. A log is cut into 10 foot boards in three minutes. The capacity of the mill is 60,000 feet of lumber, or 6 car loads, in 10 hours.

This company's business consists in erecting mills, often six times as large as this, in different parts of the country. Within the past year they have put up a number in the South. All the principal officers of the company have been at the Fair, and they have taken a number of contracts.

In this building, the Novelty Iron Works Company, of Dubuque, Ia., have shingle and lath machines which are not in operation, on account of some failure in power. It is but a step from the saw mill to the Michigan Logging Camp. This is built of split logs, the chinks filled with plaster, and is in two rooms with a sort of passageway between. The first room is at one end a kitchen with its great stove and cooking utensils hanging from the walls; the other and larger part has two long tables set with tin dishes and pewter cutlery. The walls have upon them many interesting photographs of scenes in the camps in winter.

In the other room, the men sleep in bunks arranged three deep along the wall. The idea of lumbering in those great northern forests is made complete by the enormous load of logs close to the door of the camp. There are fifty white pine logs, all 18 feet long, weighing 144 tons. They were hauled on the very sled upon which they now rest, by the estate of Thomas Nester to the Ontonagon River. One pair of horses drew them on an ice incline prepared for the purpose, after the men, by pushing at the rear, had started them. The are held together by very heavy chains.

The saw mill is a sort of supplement to the Palace of Mechanical Arts, to which I have given the simple name Machinery Hall, and logging camp, called the Michigan Outdoor Exhibit, seems a natural adjunct to the mill. Interesting and unique as they are, comparatively few people find their way to them, if I may judge from the numbers who visited them when I did. They deepen the impression which one gets at every hand that the Fair represents untiring energy, marvelous ingenuity, and the accumulative thought of many centuries.

A New Yorker's Impressions of the World's Fair.—Having spent nearly a day in obtaining a general view of the grounds and buildings, by the aid of the electric launches and one or two rides around on the Intermural electric railroad, and familiarized one's self with the geography of the place, the question is asked of persons who have spent two months or more on the Fair grounds, What is the most interesting building to enter and see first? The reply is in the shape of another question, What subject are you most interested in, as we have a wonderful variety of things to see? Such is really the fact. But something of special interest will be found in every building.

As the visitor is brought to the Fair by the aid of steam, naturally the development of this perfected method of transportation leads one to inspect the exhibits in the Transportation building, which stands near the Sixty-fourth Street entrance, one of the best in the Fair because of its great width.

To see in one building the remarkable variety of all sorts and forms of railroad, carriage, marine and primitive appliances for transportation from all parts of the world is to gain a vast amount of information in an incredibly short time. One day can be most profitably spent here. If the south end of the annex building is entered first and a northward direction followed, traveling east and west through the long lines of exhibits, a most instructive sight, illustrating the progress of railroad building and railroad construction, will be seen.

From the primitive mountain wood railway, made of round wood poles placed end to end, and a rough car, with grooved wood wheels, scarcely a foot in diameter, to the magnificent Pullman palaces, is but a step. Yet one sees the various degrees of improvement as naturally as if there had been some general design.

When the use of iron is begun for the manufacture of rails, they are about two feet long, resembling very much a cast iron grate bar spiked to cross ties of wood at short intervals. Comparing these with the mammoth steel rails 100 feet long now used by the Pennsylvania Railroad is a great jump forward.

There are notable exhibits also of the modern construction of railways in different countries, showing quite a variety in roadbeds and the use of metal ties instead of wood. In some countries the joints of the rails are supported on stone.

Next in interest is the fine display of American locomotives of all types and styles; the new mammoth machines of the triple expansion style, being in operation by means of compressed air, attract many visitors and are the admiration of all, showing the skill and perfection America has reached in this branch.

Probably never will such a collection of locomotives again be seen. Adjoining the American exhibit are the German locomotives and cars; the latter are elegant specimens, and a drawing room car, open from end to end like American cars with a center aisle, is very luxurious. The sides above the seat line are nearly all plate glass, extending to the top of the car. Instead of having wire baskets overhead just under the roof of the car to hold light luggage, the back of the seat at each end of the seat is extended upward in the form of a light plated metal pillar high enough to be out of the way of the head, and which supports a box-shaped wire basket extending crosswise to the length of the car. The car was about a third shorter than the American cars. The German locomotive has the eccentric and valve gear arranged on the outside of the driving wheels instead of underneath, and under the boiler, as in this country. It is kept brightly polished and gives the locomotive more the appearance of a complicated machine than it actually is. They are very solidly built and the workmanship is of high order. A model of a steam carriage built by Sir Isaac Newton in 1680 is especially interesting. A collection of some twenty or more full sized models old style locomotives, exhibited by the Baltimore & Ohio Railroad, rivets the attention and illustrates perfectly the evolution of the locomotive.

In connection with this exhibit, on a long screen or division wall are hundreds of large photographs of scenery on the line of the road. The English locomotives present a striking appearance, being built very solid and with a single driver wheel, usually nine feet in diameter. There were two on exhibition and they attracted much attention. The French and Belgian locomotives are by themselves in the main building, but displayed no special peculiarity other than fine finish and massiveness. In almost all of the foreign locomotives the use of the American cab for the better protection of the engineer from weather, etc., was noticeable. In vestibule trains and automatic brakes the United States is ahead of all other countries.

Beyond the Great Britain exhibit cars and devices of various kinds are shown, including many styles of switches. There is a special heating and lighting car used on one of the roads leading out of Chicago, capable of supplying a train with 200 lights. In one end of the car is a dynamo and special steam engine, while the other contains a boiler for furnishing steam to the engine and for heating the train.

The modern helps for building railroads are shown, including steam shovels, cranes and dump cars. The novelty of the latter was in the pneumatic attachment underneath on the truck for automatically dumping the platform. The old-fashioned way in building an embankment is for men to run along by each car and upset it, one at a time. The new way is to have a train of construction cars connected with a special air pipe and enable the engineer with one turn of a faucet, by means of compressed air, to actuate all the car platforms at once, throwing them at an acute vertical angle, then, when the dirt is discharged, another movement of the faucet brings the platform back to a horizontal position.

The development and utility of compressed air as applied to railroad appliances is one of the special features shown in this building. The group of air brakes all connected up, shown by the Westinghouse Company, was quite interesting, and its application to freight trains of 100 cars was demonstrated. By certain appliances in the locomotive the engineer can throw the brakes on all of the cars at once, or can apply it to certain cars on the train.

In connection with signaling and switching apparatus, compressed air is shown to be a most important factor in facilitating work and saving time.

The great snow plows used in clearing the tracks on the long continental lines, looking like huge houses on wheels, are particularly instructive.

Electric street cars, cable cars, an ammonia car, and other similar vehicles are shown in considerable variety, while wagons, carriages, etc., are very numerous. In the north end of the main building are specimen one hoss shays, a carriage Daniel Webster is said to have used, a Spanish vehicle as used in Cuba, a Mexican cart and a Japanese jinricksha. Marine methods of transportation are shown in the main hall, including models of all sorts of vessels and a section of one of the great American steamships. In the gallery are bicycles of all descriptions and numerous models of canoes, boats and canals, including a model of the celebrated Forth Bridge.

Even in one day's visit to this building, there will be much that one will overlook. The royal gilded carriage of a Brazil emperor and the Lord Mayor's coach, of London, are interesting to see. Mexico supplies a model of a Mexican on a model horse, dressed in most elaborate saddle harness.

The perfected English systems of railroad signals and switches are also shown in actual size, and America's great Bethlehem Iron Works shows examples of work equal in magnitude and perfectness of forging to the work made by the celebrated Krupp. The full sized model of their immense steam hammer is one of the prominent objects in the main hall. Everybody should visit this building, and everybody who does, brings away thoughts of the wonderful progress that has been made in transportation and admiration of those who suggested the idea of getting together such a surprising and comprehensive exhibit. In our next other notable exhibits will be treated of.

The total number of paid admissions during the month of August was 3,515,493, and the total number to date (September 26) 13,831,597.

The Science of Nutrition as Exemplified at the World's Columbian Exposition.

BY H. C. HOVEY.

In the midst of the Revolutionary war, at a time when our fathers were in danger of starvation, a man emerged from a New England village, whose experiments have done more than those of any other savant, or possibly than all other efforts combined, to find the exact combination of materials and methods that shall give both to rich and poor the most wholesome and palatable food for the least cost. The Yankee name of this great reformer was Benjamin Thompson, a farmer boy, a shop clerk, a school teacher, a soldier, a statesman, a philosopher, a nobleman, but above all, a cook. The name by which he is best known is that of the Count Rumford, a title chosen by himself from the name of the American town where he had formerly resided; but the rank was conferred by the Holy Roman Empire. His essays on the "Science of Nutrition," published by the American Academy of Arts and Sciences, contain the results of his costly and elaborate experiments in London, Munich, and elsewhere. He tells us that he was led to his peculiar line of research by observing that the Bavarian soldiers, who were remarkably strong and healthy men, and very fond of eating, contrived to live on very small sums of money, and yet enjoyed savory, nourishing, and highly palatable food. If they could do this, he reasoned that the secret of the art was "as important as anything that could employ the attention of the philosopher." To give an idea of the energy and magnitude of his operations, the fact is stated that he once had 2,600 beggars and outcasts arrested by the military patrol of Munich and transferred to an industrial establishment, where he could try his plans for making them healthy and happy.

In honor of this philanthropist the Rumford Kitchen is named at the World's Fair, where are exhibited models of his inventions, a complete library of his works, as well as much general literature on the application of science to cookery, a kitchen laboratory with all needful apparatus and utensils, and charts and diagrams illustrating culinary methods. Nothing is cooked for the sake of being sold; but samples of food are prepared and served at cost at a limited number of small tables. The meals thus offered are so popular that those are fortunate who manage to get a seat by patient waiting. Menus are printed giving ten standard luncheons from which a choice may be made for the day. There is a printed table giving the cost of the raw materials at market prices. The food values of the various dishes are also stated, giving the weight in grammes of the proteids, fat, and carbohydrates contained in each meal, and the resulting calories. So many scientific terms perplexed some of the customers.

A well-dressed lady remarked to the writer that it was well enough to tell people how many proteids and the like could be seen in food by the aid of the microscope, but for her part she preferred not to know that they were there!

As an example standard luncheon No. 2 weighed 20 ounces, and included ten ounces of escalloped meat, four of bread, seven-tenths of an ounce of butter, and five ounces and three-tenths of apple sauce. This represented in grammes, of proteids 32·2; fat 26·8; carbohydrates 138·8; calories 942·5; and the cost of raw materials was six cents, while the price asked for the prepared luncheon as served was thirty cents. This interesting exhibit of domestic science is under the direction of Mrs. Robert H. Richards and Mrs. J. J. Abel, M.D., and is in connection with the Bureau of Hygiene and Sanitation, as part of the Massachusetts exhibit. The ladies named give more ample details of their purpose and methods in "The Story of the New England Kitchen," a pamphlet full of new and valuable information concerning experiment stations in Boston.

Immediately next the Rumford Kitchen is a similar institution known as the New York Cooking School Exhibit, under the personal direction of Miss Juliet Corson. This lady, so far as is known, was the first person in America to give cooking lessons as part of the curriculum in the education of girls. The writer, therefore, regarded it as a privilge to hear what she had to say concerning the subject under consideration. To begin with, however, Miss Corson paid due tribute to the diet kitchens founded during the war, at Washington and elsewhere, by Mrs. Annie Wittenmeyer, which revolutionized the preparation of food for the sick and wounded in our military hospitals. Mrs. Wittenmeyer also published a book on the subject with special instructions for army nurses. But this work was to meet an emergency, and was accordingly transient.

Some twenty years ago, when the hard times following Black Friday made it difficult for many people to secure the ordinary comforts of life, Mr. James Gordon Bennett, Jr., started soup kitchens in New York City. He hired Rannhofer, Delmonico's *chef*, to manage them, on the principle of securing for poor people the best food at the lowest cost. At about the same time, or perhaps the previous year, certain prominent society women, among whom were Mrs. Judge Roosevelt, Miss Annie Newcomb, Mrs. A. M. Palmer and Mrs. S. C. Courtney, formed a training school for women in Miss Corson's residence in the old Rutgers block. Wheeler & Wilson gave them a number of sewing machines and also a cash donation. Work was obtained from the clothing stores, which was given to poor women at a fair price. Proofreading, shorthand, bookkeeping, etc., were taught gratis. The school was afterward removed to rooms at 625 Broadway, and at a later day to 47 East Tenth Street, where the rent was generously paid by Mrs. Elizabeth Thompson. From this point the work became popular, and all New York stood ready to help it forward.

In 1873 Miss Corson, who was both secretary and manager, got hold of the lectures that had been given at the London Exposition by Dr. Buckmaster on the chemistry of cooking, and resolved to try them in her training school. She first negotiated with an ex-cook of Governor Tilden's, a Frenchman, and as an experiment ordered him to prepare for four ladies a simple lunch. Such was this *chef's* idea of a frugal repast that the bare materials cost over $17. That would never do, and on further inquiry they found a highly trained French cook who also had proper notions as to economy, and they employed him to teach all who came for the purpose, rich or poor, how to cook all kinds of food, coarse or fine, delicate or common. The ladies themselves meanwhile studied the subject with great zeal, and Miss Corson traveled extensively, investigating local methods everywhere in their economical, sanitary and scientific relations. At their suggestion, in 1878–79 the United States Bureau of Education sent out circulars requesting from all sources all available information, and thus gained a mass of knowledge subsequently embodied in a cooking school text book.

Under the auspices of Hon. John Eaton, United States Commissioner of Education, and encouraged by Mrs. President Hayes, Miss Corson gave a series of lectures and practical lessons in Washington, D. C., attended by women of all classes, as well as by the girls in the high school and other institutions. Then the Ladies' Educational Association, of Montreal, under the patronage of the Princess of Wales, invited Miss Corson to do similar work there. The result was that scientific cookery was made a regular part of the education of girls in the public schools, in which they were examined as in other studies, and graded according to their proficiency. The next city where this plan was adopted, under the instruction of the same indefatigable teacher, was Oakland, Cal. During the last decade there have been numerous cooking schools originated by her in Chicago, Cleveland, St. Louis, Philadelphia, Baltimore, Hartford, Concord and Washington, as well as in the State Charities Hospital on Blackwell's Island, the city hospital of Brooklyn, and various other hospitals and sanitariums.

When it was proposed to have a model cooking school at the World's Fair, Mrs. Potter Palmer wrote to Mrs. J. S. T. Stranahan, of Brooklyn, vice-president of the New York State Board of Lady Managers, who suggested what has since taken shape as the New York State Cooking School Exhibit, under Miss Corson's personal direction. Here are shown daily, from 10 A. M. to 4 P. M., the best scientific and practical systems formulated as the result of twenty years' experience and investigation. Women are especially invited to use this opportunity to introduce novel methods of kitchen work and inventions in culinary art.

The "Corn Kitchen" is still another exhibit of the same general nature, though more especialiy intended to show the many uses of corn as a food. This is under the direct auspices of the State of Illinois, and is located on the second floor of the Woman's building. Mrs. Sarah T. Rorer, from the Philadelphia School of Cookery, has charge of it, and in addition to corn cooking, aims to illustrate every kind of kitchen work. Her lectures are so popular that the guards often often have to break the crowds that gather around the doors after every seat has been taken. The following order is observed: Monday, soups and other dishes, with meat for a basis; Tuesday, bread made with yeast; Wednesday, pastry, plain and fancy; Thursday, poultry, including dressing as well as cooking; Friday, waffles, johnny cakes, and all kinds of quick bread; Saturday, desserts of every description. The rules require that something about the use of corn must be taught at each lesson. Around the hall are arranged different articles regarded as desirable for household use, including novel forms of cook stoves, heaters, etc.

Mrs. Rorer has also a training class of girls between 12 and 16 years of age. It is limited to twenty pupils, and is free, five days a week, for one month; after which another class takes its place. Any girls may apply, regardless of family influence, race, color, or condition; the first applicants that come being taken. During the month they have passes admitting them to the Fair grounds. While in the general lectures Mrs. Rorer and her assistants do the cooking in the presence of the audience, the girls in the training classes have to do all the work themselves under the direction of the instructor. Though dealing mainly with methods, much valuable information is given concerning muscle food, brain food, hygiene, domestic economy, and the proper management of the home.

Where did Oxygen Come From?

It has often troubled philosophers to tell whether there is oxygen on the sun or not, but the late Mr. Proctor was of opinion that there is. Perhaps he was right; but on the strictly evolutionary basis, if Dr. T. L. Phipson is to be believed, he is wrong. Investigating the matter from the biological point of view, he observed that micro-organisms "manufactured oxygen," although they were not supplied with it. He also grew plants in an atmosphere of pure carbonic acid gas or a mixture of that and nitrogen, or in pure nitrogen alone with a root feed containing CO_2, he found that oxygen was gradually "manufactured." There is nothing very startling in that; in fact, it is entirely according to the Chemical Hoyle and biological precedent; but Dr. Phipson takes us back to the primitive ages of the globe, when there was no free oxygen upon it—because, he explains, there are now in the earth's crust matters which are oxidizable, and would have been oxidized during these far-back ages if there had been free oxygen to do it. So we arrive at the conclusion that there was at one time an oxygenless atmosphere. Where did the oxygen come from? Dr. Phipson replies that the oxygen of the atmosphere is the product of vegetable life, and "into the primitive atmosphere of nitrogen plants have poured oxygen, year after year, for countless myriads of ages, until it has attained the composition which it has at the present day."

Transparent Leather.

According to the *Magasin Pittoresque*, transparent leather may be manufactured as follows:

After the hair has been removed from the hide, the latter, tightly stretched upon a frame, is rubbed with the following mixture:

Glycerine (26° B.)	1,000 parts
Salicylic acid	2 "
Picric acid	2 "
Boric acid	25 "

Before the hide is absolutely dry, it is placed in a room which the rays of the sun do not penetrate, and is saturated with a solution of bichromate of potash. When the hide is very dry, there is applied to its surface an alcoholic solution of tortoise shell, and a transparent aspect is thus obtained.

This leather is exceedingly flexible. It is used for the manufacture of toilet articles, but there is nothing to prevent it from being used for foot gear, and, perhaps with fancy stockings, shoes made of it would not prove unpleasing to the sight. They would at least have the advantage of originality.

Correspondence.

Cure for Snake Bite.

To the Editor of the Scientific American:

From time to time I see in the papers recipes for curing the bites of poisonous snakes, recommended by medical and other people. In California, where I come from, we have occasion at times to treat animals for the bite of the deadly rattlesnake. I have seen two kinds of herbs used, one is called in Spanish "la golondrina" (the swallow), growing in the most arid plains; the other is the rattlesnake weed. Both are very effective, but it is not every one who can tell them, even when at hand. What I know from my own experience to be an infallible cure is the gall of the snake itself. One drop of it on the wound will effect a cure, even when inflammation is far advanced. I have seen a dog treated whose head had already swollen to twice its natural size, and it cured him almost instantaneously. The gall may be preserved in alcohol, or even dried, requiring in the latter case only to be moistened; even saliva alone between two stones will do. (I have seen a case of this kind.) If preserved in alcohol, of course, the whole bag of the gall is put into the liquid entire. If true of the rattlesnake, and, as I said before, I know it is infallible from my own experience, it is probably true of all other poisonous snakes, and might it not be true in the case of the rabies, that the gall of the animal would cure the bite?

When at college, in London, the teacher in French, who had been a Spahis in Algiers, assured me that the Arabs cured the sting of the scorpion by mashing the scorpion and applying it as a poultice on the wound. This I have never seen tried, however.

Mexico, Sept. 8, 1893. E. F. DE CELIS.

Increasing the Temperature of Steam.

Some short time ago, it was suggested by Lord Rayleigh that the efficiency of the steam engine might conceivably be increased by adding some salt to the water in the boiler, which should have the effect of raising the boiling point of the solution. The idea sought to be conveyed was that the initial temperature of the working fluid might be thereby increased; thus providing for a larger range and a greater fall of temperature between the boiler and the condenser.

Certain critics objected to this proposition that to raise the boiling point of an aqueous solution does not necessarily imply a corresponding elevation of the temperature of the evolved vapor, which is simply that of water, and must accordingly possess only the temperature corresponding to the pressure. A number of experiments to determine the temperature of the steam arising from a boiling salt solution have been made from time to time; but the results have been of a conflicting character. The difficulty of arriving at trustworthy results in this class of experiments consists in the circumstance that, while the walls of the steam chamber must be at a temperature higher than that of boiling water, and yet below the temperature of the solution, a sufficient quantity of steam must be evolved to insure that these walls shall not exercise any appreciable cooling effect upon it. These *desiderata* are claimed to be all satisfied by an arrangement devised by Professor Sakurai, of the College of Science of the Imperial Japanese University, by the aid of which it has been determined that the temperature of the steam escaping from boiling aqueous solutions of such salts as calcium chloride, sodium nitrate, and potassium nitrate is exactly the same as that of the solution itself. This is a corroboration of Lord Rayleigh; but, whether the fact is of any material service to mechanical engineers remains to be seen.

The New Morgan Liner El Cid.

The new freight steamship of the Morgan line El Cid has just completed her maiden voyage between New Orleans and New York, breaking all maiden records, her time being 4 days 2 hours and 15 minutes from bar to bar. Her average speed was 16¾ knots per hour, and her greatest run in one day 450 miles, which is certainly very creditable for an American-built coastwise steamer. El Cid was built by the Newport News Shipbuilding Company, of Newport News, Va. She is 406 feet long, beam 48 feet, and registers 4,500 tons. Triple expansion engines drive the 18 foot four-bladed propeller, the shaft measuring 16 inches in diameter. The boilers are three double-ended Scotch boilers, 26 feet 6 inches in length by 13 feet 10 inches in diameter. The vessel is lighted by 112 incandescent lamps. The pilot house is fitted up in a luxurious manner.

THE Weed boiler, which was described in our issue of Sept. 23, is made in such small sizes—⅛, ½, and 1 horse power—as to render it admirably suited for a great deal of amateur work. That it is so employed to a large extent is probably a leading consideration of its makers, Messrs. A. J. Weed & Co., of 106 and 108 Liberty Street, New York, in making safety and durability the first consideration in its construction.