



In the Palace of Mechanic Arts at the World's Columbian Exposition the various exhibits in which the work of manufacture is carried on attract the greatest attention. They are many of these exhibits and they are always surrounded by interested audiences. The lookers-on appear even to begrudge the operatives the little time for lunch at noon, when the machinery is stopped. Most of these exhibits sell souvenirs that are made on the spot.

One of the most interesting of these exhibits is that of the Crown Fountain Pen Company, Chicago, which has in constant operation over a dozen machines illustrating the making of pens. The gold from which the pens are made is received in sheets, stamped, split and completed, even to the work of pointing with iridium points.

The manufacture of thimbles is shown by Simons Brothers & Co., of Philadelphia. The cups or blanks as they come in the rough from the press are finished in this exhibit. The operation of putting the many small indentations upon the thimble is called knurling, and one man can knurl about forty-five dozen thimbles a day. In addition to knurling, he smooths off the surface and ornaments, burnishes and finishes the thimble within and without.

The Knowles Loom Works, of Worcester, Mass., occupy a large space with a variety of looms, which are operated in weaving ribbons, worsted dress goods, silks, plain, figured and brocaded, carpeting, gingham and other fabrics. The Crompton Loom Works have a similar display, including a very wide loom which weaves rugs.

There are several exhibits in which silk badges, with pictures of Columbus, President or Mrs. Cleveland, as souvenirs are made; also figured silk handkerchiefs and other fabrics.

Schaum & Uhlinger, of Philadelphia, occupy a large space in which they weave these and other souvenirs and also weave silk cloth in a design and at the same time put over the groundwork figure another figure which gives the work an effect of hand embroidery.

Another interesting exhibit is that of the Star and Crescent Mills, of Philadelphia, by which Turkish toweling is made in various sizes, and young women operatives tie the knots in the fringes with surprising rapidity. As a comparison of new methods with old ones there is shown in this same exhibit a Turkish hand loom operated by a Turk, showing the slow and tedious manner in which this toweling was originally manufactured.

The Willimantic Thread Company occupy a large space with several machines. The thread is received here either in the hank or on bobbins. If in the hank, the thread is wound on bobbins and is rewound from these bobbins on spools. The spooler is an automatic machine, which requires only that the spools be fed into a trough and that the thread be fastened on the spool. The machine automatically takes the spools one at a time from the trough and, after the thread is fastened, winds until the spool is filled, then catches the thread, drops the spool into a receptacle, then takes up an empty spool and proceeds as before. Another machine pastes the labels on the ends of the spools, requiring no more attention than that of feeding the spools into a trough.

The Lowell Machine Shops, Lowell, Mass., illustrate the processes of weaving cotton cloth, beginning with the bale of cotton and ending with the finished cloth, marked, stamped and ready for market. The baled cotton is opened and the cotton run through the several operations from the picker through the spinning of the yarn, then is transferred to the looms and woven.

One of the most ingenious little devices exhibited is an electric engraving machine. The cutting point receives its energy in the form of rapid pulsations from the electricity, and if the operator is skillful in sketching, he need only take this tool in his hand and guide it according to the design he wishes to engrave; and the work is done nearly as quickly as a sketch could be made with a pencil. Souvenirs in variety are engraved while the purchaser waits.

Several manufacturers of sewing machines and embroidering machines make extensive exhibits of their machines in operation.

Several large printing presses, exhibited by the Chicago daily papers, run at specified times, printing papers at a speed of from 10,000 to 40,000 copies per hour. Crowds assemble every day to watch the starting of the printing presses.

Another incident that draws many spectators daily is the starting of the 2,000 horse power Allis engine, the king of the engine plant.

An innocent-looking machine shows a cylinder about four feet in diameter, the surface of which is roughly engraved with no ostensible intent or purpose. But when in operation a board of maple, whitewood, boxwood or almost any other wood, when fed into one end of the machine, comes out at the other end transformed into such a perfect imitation of quartered oak that only an experienced dealer would detect the manufactured article from the genuine.

Probably the largest machine tool shown in the Palace of Mechanic Arts is the planing machine exhibited by the Niles Tool Works Company. It weighs 270,000 pounds, and has a capacity for planing to the width of 144 inches and to a length of 32 feet or more. This is believed to be the largest planer ever built. A machine of this size is now used in the works of the General Electric Company, at Lynn, Mass. The table of this planer is one casting, weighing thirty-five tons. The machine is connected with the power plant of the Exposition, so that its working can be shown. The table returns at a speed three and one-half times greater than when it is feeding. By the use of an auxiliary attachment, which can be placed or adjusted on either side of the machine, a cutting width of 25 feet is afforded. This company also exhibits several other large machines, including a horizontal ten-foot boring and milling machine, a six-foot boring and turning mill, a 63 inch heavy forge turning lathe, and other machines.

In the Transportation building there is a most interesting exhibit from Germany, consisting of part of a plank road that was built by the Romans over a moor near Osnabrueck. It was a military road constructed across this moor ten and one-half miles long. It has been buried under moss all these centuries, but was uncovered last year from a depth of six feet of moss and other accumulation. The planks are quite badly decayed, but show faithfully the manner in which the road was constructed. Each plank seems to rest on the one ahead of it, and is pinned to the ground with a wooden pin eighteen inches or so long, passing through a hole in the plank at each end.

A tramway exhibit, also made by Germany, comprises a type of tramway that was used in the sixteenth century, and occasionally seen even at this day in some districts of Hungary. It presents a small wooden car of about two barrels capacity mounted on wheels which are but little larger than the hub of the wheel of an ordinary draught wagon. These wheels run on rails of wood laid about thirty inches apart. A switch forms part of the model. Crude as this model is, it reproduces completely the general plan upon which tramways are constructed at this day. Another exhibit reproduces the track of a tramway that was in use in Wales in 1776. The rails are a yard in length, and are of the angle rail type, having a guard of considerable height on the inside. The rails are of cast iron, fish-bellied. Each joint rests upon a roughly hewn stone about fifteen inches square. It was upon this road that Trevethick made an unsuccessful effort in 1804 to run an engine operated by steam.

Other models of tracks on this plan of construction are shown, each showing an improvement in some respect over those preceding it, until the modern method of railway construction is reached. The development of the modern railroad track with various modifications is followed down to the latest practice.

A collective exhibit of the products of the seven great Northwestern States traversed by the Northern Pacific Railroad Company is made by this company in a train of exhibit cars, which are fine specimens of car building and which are fitted up with an exceedingly attractive display of products of the Northwest. These cars were built at the shops of this railroad company and are vestibuled, and also have large bay windows on each side, reaching from the floor to the roof. The interior of the cars is ornamented with fancy woods from the forests in these States; also with grains and grasses. Large displays are made of ores and minerals of all kinds, building stones, and also the various products of the soil, including hops, flax, tobacco, etc. Each fruit in season is exhibited, showing the perfectness to which it reaches in these States, which are Wisconsin, Minnesota, North Dakota, Montana, Idaho, Washington, and Oregon. Many fine photographs of scenes along the route add much interest to the exhibit.

In the Palace of Mining, the Russell process of lixiviation for free and rebellious silver and silver-gold ores and tailings is well illustrated by a complete working model one-twentieth in size. This model illustrates a plant in operation which has a capacity of 125 tons. The entire operation of this process is demonstrated, from the placing of crushed ore in the vat to the recovering the metals and clarifying the chemicals.

The entire south gallery of the Mining building is occupied by the exhibit of American tin plate industries. It begins with samples of ore of the tin and of the iron from which the steel billets are made. Pig tin is shown that was mined in this country, being

from the Temescal, California, mines. Many samples are shown, illustrating the various operations through which the metals pass before the plate is complete. Steel billets are shown in several stages of completeness up to the last stage, in which the sheet steel is ready for the dipping operation. Large sheets of American tin and also many samples of terne plates are shown, both singly and in cases. Coke, limestone, and other ingredients used in the operation of preparing tin add to the completeness of the exhibit. In the South Dakota exhibit, tin ore from the Harney's Peak mines is exhibited, and California makes further exhibits of tin in this building and also in its State building.

The H. C. Frick Coke Company, Connellsville, Pa., occupies a large space with models of coke ovens, samples of coke, and other accessories to the coke business. There is hardly a more practical and instructive exhibit than this. It shows a bank of sixty-four coke ovens in miniature, each oven complete in itself and being as natural as life by the use of illuminating gas, which is burning at all times. There is a superstructure over the shaft of a coal mine, with other necessary buildings to contain the engine and boiler plant, machine shop, etc. The engine plant is a perfect working model, so that by moving a small lever the engine is made to run, and the hoists which raise the coal up a shaft run up and down, fully explaining the manner in which the coal is raised from the mine to the bins overhead. The small cars, or larries, which convey the coal from the bins to the ovens, and which have a capacity sufficient to fill one oven, are run back and forth on a track between the double row of ovens. In front of the ovens are piles of coke, barrows, and railway tracks from which the coke is shipped directly from the ovens to market. Four model tenement houses, such as are built by this company for its miners, form part of this exhibit, which in reality represents only a small part of the Standard plant, which comprises 905 ovens. Another feature of this exhibit is a model bin and hoisting plant on a somewhat larger scale, which illustrates in somewhat more detail the manner in which coal is raised from the mine. This plant is of the most modern type, having a steel superstructure with all the latest appliances.

A large map of the United States, giving the location of each coal deposit in the country, and of every coal mine in operation, forms another exhibit. This map is 18x36 feet in size, and is stretched out on the floor under glass so as to be readily studied. Surrounding it are shelves filled with samples of coal, each numbered to correspond with numbers on the map, so that visitors at the Exposition who wish something more than the superficial view of this exhibit can see samples of coal from every mine in operation. Twenty-three States are represented in these samples. Another interesting exhibit from Pittsburgh, Pa., shows the manner in which river steamers take big tows of barges of coal down the Ohio and Mississippi Rivers. This model represents a typical stern-wheel steamer with twenty barges in tow; each barge is supposed to represent a barge 130 feet long, 25 feet wide, and having a capacity of 13,000 bushels. At present tows are often twice the size of that represented, not infrequently as much as 20,000 tons being transported in one tow.

The exhibit made by religious organizations is in the northwestern corner of the gallery of the Palace of Manufactures and Liberal Arts. These exhibits are almost entirely of tracts and other church literature, together with portraits and photographs. The American Bible Society occupies one of the most advantageous booths, and displays Bibles in a large variety of bindings and sizes, from souvenirs of the Exposition to finely bound volumes. There are Bibles printed in 242 languages. Included among these is the Bible as just translated for the use of the natives in the Gilbert Islands, in the Pacific Ocean, representing the last work of translation of the society. A few of the historical Bibles owned by this society are shown, among them being pages from Eliot's Indian Bible, edition of 1685, and a copy of the first edition of the authorized version, printed in 1611. This is what is termed the King James version. There is also a fine reprint of the first book ever printed in which movable type was used. This bears date of 1450, and is the Scriptures in Latin. In one corner of the showcase is the "curiosity corner," containing a variety of articles that have been paid in exchange for copies of the Bible. The most highly prized article is a Chinese coin, which is believed to be 1850 years old.

Inside the north entrance of the Government building is the United States hatching exhibit. The last fish was hatched a month ago, and Mr. Day, by way of giving effective illustrations of the process of artificial fish culture, has had recourse to some very ingenious devices. There are various styles of hatching machines. Practically they are constructed on the same general principle. Perhaps the glass jar machine gives the most satisfactory results. As its name im-

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WORLD'S FAIR NOTES.

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plies, it is composed of a large glass jar fitted with a lid which screws down tight. Two glass tubes extend through the lid, and one reaches the bottom of the jar. Water is run through the longer of the tubes into the jar, which is about half full of the tiny eggs of the fish, and maintains them in continual motion. Unless the eggs are thus kept moving, they would very soon first unite and then decompose. The spawn is thus agitated until a pair of eyes show through the thin membrane that envelops the egg. Then the tail begins to develop, and as it grows it swings round until the egg breaks. Eventually the fry is carried by the overflow tube to a still larger glass jar called the nursery. Food in a comminuted state is there supplied to the fry, and as soon as the young is large enough it is introduced to a large tank and fed with bigger pieces of food. Finally the sufficiently matured fishes are shipped off to wherever there is need of a finny population in lake or river. It takes four days to hatch a shad, but whitefish require from forty to a hundred and twenty days under the same conditions.

A Bible which came from England in the Mayflower and was in use on board that vessel in 1620 is to be seen at the World's Fair. It is the property of Mr. and Mrs. James L. Gates, of Milwaukee, Wisconsin. Mrs. Gates came to possess the prized volume through her father, Mr. John G. Meade, of Northwood, N. H. It has been owned successively by the Winthrops, Moultons, Howlands, Hiltons and Meades, these being the ancestors of Mrs. Gates. This Bible was published in London in 1611. There is no doubt of its history; considering that it is 282 years old, it is remarkably well preserved. It is quite complete from Exodus XV. to the First Epistle of John. The type is large and clear, and the press work first class. The book typographically must have been high up in its day and generation. It is a pure King James, and mention has been made of it in the encyclopedias as historic. Both the boards of the cover have been gone long ago, but a piece of the back is still attached. Though the leaves are faded they are still strong and clean. Frequent notes are entered on the borders and bottom of the pages. The old-fashioned "s" of the form of an "f" is used.

Among the objects of interest that were intended to be exhibited at the World's Fair was a checker board, a remarkable result of taste, skill, and patience. Charles Manson is the name of its maker. He was born in Sweden, and there he acquired the art of wood carving, for which so many of his countrymen seem to have a natural aptitude. He now claims Chicago as his residence. The board is 20 inches square and is mounted on cork legs 3 feet high. This table is composed of no less than 28,070 pieces of wood, representing almost every known kind of timber, from the cedar of Lebanon to the pine of Georgia. Some of the pieces are as thin as paper, and every one of them was cut by hand. It took three years to finish the work. On the top the variously colored woods are arranged so as to make very effective mosaic groups. The cost of this table has been estimated at \$1,000. Occasionally, in modern times, prolonged application of artistic talent has been put forth by mechanics, and where the result is worth the pains, it has a moral effect of considerable value; but to see what man can accomplish in minute objects requiring a great many years for their completion, one has to go back to ancient Babylon. The products of the seal and stone cutters of that famous seat of civilization are at this day a marvel. What sustained them in the long task, and enabled them to execute so exquisitely in the very minutest details, was, as an antique motto has it, "loyalty to the sovereign and fidelity to the gods."

In the Old Vienna department of the Midway Plaisance there is on view a most interesting collection of mummy portraits. When the body of an ancient Egyptian was embalmed, it was the custom of the relatives to place his portrait outside the mummy case. The portrait was generally painted on a thin wooden panel, and it was so laid over the face of the deceased, and so wrapped round the edges by the shroud, as to produce the effect of a living person looking out from the drapery at the mourning friends when they paid a visit to the place of sepulcher. Recently great numbers of such portraits have been discovered in an excellent state of preservation. The execution is in many instances excellent, and the color still remains surprisingly fresh. These portraits have been found of much scientific value from an ethnological point of view.

The threatened war in Siam has fixed all eyes upon that little country, and the exhibits of Siam at the Fair are coming in for a full share of the awakened interest. The display of the kingdom of the white elephant though small is creditable; fine wood, ivory, and metal work fills up the small pavilion, or rather pagoda, in the Manufactures building. Some idea of the richness of the metal work may be obtained when it is stated that a single cuspidor exhibited is valued at \$500. In front of the pagoda are enormous elephant tusks valued at \$2,000 apiece. The display in the Agricultural building is very fine, some of the Siamese

plows being inlaid with mother-of-pearl. The Siamese excel in fruit preserving, many of them being carved into the form of flowers. In the Transportation building may be seen bullock carriages, the joss chairs used by priests in carrying idols, green chairs for officials, and various kinds of boats.

Many of the exhibits at the fair have a card fastened to them, asking visitors in English, French, German, Italian, Spanish, Turkish, and Arabic not to touch the articles exhibited. It is very noticeable that most of the handling of articles is done either by the Hoosier or the Connecticut Yankee, and the exhibitors fear the deadly umbrella which is frequently used to see whether a porcelain jar is hollow or not. A correspondent saw four pieces of fine Austrian glassware swept off the exhibition table in the Manufactures building, a few weeks ago, by a woman with an umbrella with which she pointed to the exhibits.

The sign "Sun Spots Now on View" attracts crowds to the Naval Observatory. The government does everything at the Fair in the most liberal manner and the observatory is open to visitors from 1 to 5, and on pleasant evenings from 8 to 10 o'clock the lieutenant in charge entertains visitors by views of the stars. The sun spots are finely shown by the five inch equatorial.

The other evening a sky-rocket crashed through the roof of the Manufactures building and set fire to one of the curtains near the roof; three firemen climbed out on one of the cross beams and tore down the curtain, which was extinguished when it reached the floor. It is the opinion of Exposition officials that, had the roof of the Manufactures building been crowded with visitors, as doubtless would have been the case but for the recent action of the administration in regard to prohibiting visitors from ascending to the roof, a panic would have ensued that must have resulted disastrously. Hereafter all fireworks will be set off from floats moored 1,000 feet out in the lake.

The National Commission has given notice for all exhibitors and others who contemplate bringing suits against the United States government for losses and damages sustained by them at the World's Fair, to file an itemized account of such claims. It is understood that already suits amounting to \$400,000 have been prepared. The suits are mainly on account of damage to exhibits. It is a significant fact that the government had to pay \$300,000 after the New Orleans Exhibition.

Alexis Columbus, of Buffalo, aged one hundred and four years, has arrived in Chicago. He is said to be a lineal descendant of Columbus, who was the great-great-great grandson of Christopher Columbus, whom he resembles in a remarkable degree.

Sweden began a three days' celebration on July 20, when a mighty column of people from the land of the Midnight Sun entered Jackson Park with music playing and yellow and blue banners waving everywhere. Fifteen thousand people marched in the parade, each with a knot of blue and yellow somewhere about the person. The singing societies rendered appropriate music. The Swedish building was thronged all day, and the exhibit of this rich little country was much admired.

The huge search light on the Manufactures building was made by Schuckert & Co., Nuremberg, Germany. The lamp requires 150 amperes and 50 volts. The mirror is 5 feet in diameter, and the thickness is nearly an inch. It is heavily silvered on the back. The lamp is operated by small electric motors. The surface intensity of this mirror is 194,000,000 candle power, and the light is so brilliant that a newspaper may be read by its light eight miles distant.

POSITION OF THE PLANETS IN AUGUST.

JUPITER

is morning star. The stately planet is in quadrature on the 22d at 10 h. 53 m. P. M., when he is 90° west of the sun. He is then symmetrically placed half way between conjunction and opposition, rising about midnight, and making his meridian passage about sunrise. He will appear before midnight, after quadrature, and the time will soon come when it will no longer be necessary to rise in the small hours of the night to behold this radiant orb. Everything about this planet is interesting, and is becoming more so as investigation is more closely directed to his cloud surface and the movement of his satellites.

The great red spot of 1878 is as much of an enigma as it was when first discovered. The brilliant astronomical event of 1892 was the discovery of Jupiter's fifth satellite. Latest of all, Mr. Pickering from his eyrie at Arequipa reports some anomalous proceedings of the Jovian satellites, especially the first satellite. It presented a variety of form or shape, being elliptical, round, almost round, perfectly round, with all the intermediate phases. The third satellite on emerging from behind the disk of the planet was flattened in a direction parallel to the planet's border. The observer suggests that the Jovian atmosphere is the cause of the flattening.

Jupiter in quadrature is in fine position for observ-

ing his satellites. The following are some of the most interesting configurations. They are taken from the Nautical Almanac, are for an inverting telescope, are given in Washington mean time, and 1 o'clock in the morning is the hour to look for them.

On the 3d, I, II, III, IV, are all on the right or eastern side of the planet.

On the 7th, IV is making a transit, I and III are on the left, and II is on the right.

On the 8th, II is making a transit, III and IV are on the left and I is on the right.

On the 12th, I is making a transit, II and IV are on the left and III is on the right.

On the 17th, II, I, III, IV, are all on the right.

On the 20th, I is occulted, II and III are on the left and IV is on the right.

On the 23d, III is occulted, I and II are on the left and IV is on the right.

On the 27th, I, III, II, IV are all on the left.

The moon, two days after the last quarter, is in conjunction with Jupiter on the 6th at 3 h. 18 m. A. M., being 4° 10' north. The conjunction is visible, occurring an hour and a half before sunrise.

The right ascension of Jupiter on the 1st is 3 h. 48 m., his declination is 18° 48' north, his diameter is 36".0, and he is in the constellation Taurus.

Jupiter rises on the 1st at 11 h. 47 m. P. M. On the 31st he rises at 9 h. 59 m. P. M.

VENUS

is evening star. Her movement in this part of her course is very slow. She remains at about the same distance from the sun during August as she did during July, setting about an hour and five minutes after the sun on the 1st and an hour and twelve minutes on the 31st. She is, however, coming toward us, for her size and brightness are increasing. Her diameter, which, at superior conjunction, was 9".8 is at the end of the month 12".8, her light number, which at superior conjunction was 46.8, is at the end of the month 68.7, and instead of being a full round orb represented by unity or 1, her enlightened surface is indicated by 0.843 at the end of the month, and she is decidedly gibbous when seen in the telescope. Figures are, however, not needed except to strengthen the impression. The observer who watches the sunset will in a short time behold the star where sweetness and serenity are enthroned, and will readily recognize the approach of the planet to the earth from her greater brilliancy.

The moon, when a two days' old crescent, is in conjunction with Venus on the 13th, at 6 h. 0 m. P. M., being 1° 41' north. Moon and planet will be near each other when it is dark enough to see them.

The right ascension of Venus on the 1st is 10 h. 27 m., her declination is 11° 21' north, her diameter is 11".4, and she is in the constellation Leo.

Venus sets on the 1st at 8 h. 20 m. P. M. On the 31st she sets at 7 h. 43 m. P. M.

MERCURY

is the evening star until the 8th, and then morning star. He is in inferior conjunction with the sun on the 8th, at 5 h. 3 m. A. M., when he appears on the sun's western side to commence his short career as morning star. He reaches his greatest western elongation on the 25th at 9 h. P. M., when he is 18° 16' west of the sun, and is visible to the naked eye as morning star.

The moon, on the day of her change, is in conjunction with Mercury on the 11th at 2 h. 5 m. A. M., being 9° 32' north.

The right ascension of Mercury on the 1st is 9 h. 27 m., his declination is 10° 4' north, his diameter is 11".0, and he is in the constellation Leo.

Mercury sets on the 1st at 7 h. 16 m. P. M. On the 31st he rises at 3 h. 59 m. A. M.

SATURN

is evening star. He is in conjunction with Gamma Virginis on the 8th, being 34' south. After that time he recedes from the star, and will return to its vicinity only after making a thirty years' trip around the zodiac. Saturn and the double star have for several months been objects of great interest to naked eye observers, while the telescope has brought them out in almost unrivaled splendor. The planet encircled by its rings and moons, and the noted double star, sometimes seen in the same field, have had many enthusiastic admirers. European astronomical journals abound in appreciative descriptions of the unique celestial picture. The exhibition closes during the present month.

The moon, when four days old, is in conjunction with Saturn, on the 15th, at 9 h. 59 m. A. M., being 1° 26' south. The conjunction is invisible, occurring in the daytime.

The right ascension of Saturn on the 1st is 12 h. 34 m., his declination is 1° 11' south, his diameter is 15".6, and he is in the constellation Virgo.

Saturn sets on the 1st at 9 h. 44 m. P. M. On the 31st he sets at 7 h. 52 m. P. M.

MARS

is evening star. He is in aphelion on the 16th at 11 h. P. M., and at his greatest distance from the sun, 13,-