Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

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NEW YORK, SATURDAY, JANUARY 24, 1885.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 473,

For the Week Ending January 24, 1885.

Price 10 cents. For sale by all newsdealers.

THE NEW ORLEANS EXPOSITION.

It is perhaps to be regretted that the managers of this great enterprise threw open the doors to the public while there was yet so much to do to place the Exposition in complete order. There was some excuse for this in the unexpected magnitude which the enterprise assumed, and then some exhibitors always will be tardy, no matter how much time is allowed them for completing their arrangements; besides, the railroads seem to have made very inefficient provision for handling the great quantities of freight. The incompleteness of the show at first was, however, probably less of a drawback than the weather, rain having fallen almost continuously for the first three weeks. With the getting of the display in perfect running order, and the advent of brighter skies, there is now a much larger attendance of visitors than there was at first, and the managers are looking confidently for a steady increase.

February will, according to all former experiences with the weather in New Orleans, be the most pleasant month in which to visit the great Exposition there. Ordinarily then the foliage is green, and there is an abundance of flowers and fruit, while the air is as balmy as that of a May day at the North. The Louisiana Jockey Club races commence January 20, and racing is announced for every intervening day for five or six weeks. A contract, it is said, has also been entered into for a series of Spanish bull fights, but this cruel sport, it is hoped, the managers will refuse to tolerate. In February, also, will occur the great Mardi Gras Carnival, a festival of Spanish origin, entirely unknown in the rest of our country, but which has always marked the season of greatest activity in the metropolis of the Southwest.

With all the last named attractions, added to those of the great Exposition, which should be at its best next month, New Orleans ought to be crowded with people from every part of our country, and likely it will be.

THE TAPER FIT.

This method of fitting holes has been used less than it should have been; it was too much trouble in the olden time. A straight hole and a straight plug was considered cheaper, and therefore better. It cost little skill or wages for a good workman to bore a straight hole and turn a straight plug; while to taper the hole and taper-turn the plug, and make a finish fit, required skill and time.

For some purposes there is nothing that will take the place of a taper fit. Recently a crosshead pin of crucible steel was noticed in a cast iron crosshead. It had two tapers, not on the same grade, one in one wing of the crosshead and the other in the other wing. The two tapers were not made by a single reamer with a uniform slant; they were different in diameter and in "slash," or degree of taper, and yet the fit was admirable. When the steel pin came to its bed, or home, it was secure without urgent persuasion; a slight tap of a soft metal mallet seated it. No keyway and spline was needed to hold this union as one, but a simple cross pin, only enough to prevent jar from starting the fit, was required.

These taper fits are useful when well made from their readiness of removal; a taper fit means that the parts do not fit at all until "they are home;" whereas a straight fit must "feel its way" its whole length, and sometimes—as when a steel plug fits an iron hole—it must partly cut its way and seat itself. It costs more to make taper fits than straight fits, but when the more perfect union of parts is assured, and the readiness of the parts to be separated on demand is considered, it is the best fit of cylinder to cylinder that is possible.

WOOD CARVING.

The hand carving of wood for house finish and interior decoration is becoming a distinct and permanent branch of industry. Much of this work has been done by amateurs as a pastime, but it has lately developed, to a considerable extent, into a "trade," industrially speaking. For fine furniture the carving of wood has for a long time had a place, but there appears to be a prospect that to the joiner's shop and work will be added those of the carver as a means of finishing interiors. Foreign workmen, at present, comprise the larger part of the workers in this industry, but the attention of our native workers has been directed to it, with the result of bringing it into general notice.

The idea that artistic hand work should be confined only to rare and costly material is hardly consistent with the demands of taste. In the woods there is scarcely one that will not be beautified by hand carving. So common a wood as white pine is susceptible of producing very fine effects even when the wood is left in its natural condition. When first worked, it is a creamy white well calculated to show the shadows of relief; and exposure to the air soon deepens its tint. A thin varnish of shellac will tone its whiteness without producing a shiny surface. White wood is also a wood well adapted to carving, and the yellow birch is even finer. To these light colored woods may be added the three varieties of maple and also beech. The darker woods admit of bolder work—greater relief—and when united with the lighter colored woods make a fine combination. Carved white wood as a cornice for a room, the figures only slightly cut in, with cherry for the projecting moulding, produces an elegant effect in a parlor. The only finish is a thin varnish of shellac dissolved in alcohol, no touch of sandpaper being allowed to subdue the sharp cuts of the carving tool. There is scarcely any limit to the possibilities of wood under the hands of a skillful carver; straight lines and sweeping curves are not alone among its capabilities; it may be fretted, diapered, dentaled, and stippled, and cut into fine cross-hatcheling, if the workman has good tools and knows how to use them. As this is written, there lies on the desk a piece of butternut wood six inches long and about one inch diameter, that is cut into a triple spiral, of about three turns, each spiral being round and about the size of a rye straw. This shows the capabilities of wood.

Wood carving is a pleasant occupation, combining the attraction of taste with the pleasure of work. In many instances the carver is his own designer; it is better so, and the business is incompletely learned where the carver cannot originate, or at least design, his own work. The designs for an elaborate job are usually two, a plan and a profile. The profile is drawn in differently colored lines to indicate the relative depth or projection of the parts. The business offers an attractive field for workers who are artistically inclined.

MAKING CHERRIES.

No allusion to horticulture is intended. "Cherries" are mills or reamers for cutting out—or rather for finishing—hollows of a cylindrical or ovate form; a familiar instance being the hollowed jaws of bullet moulds. These moulds are formed in steel or in tough iron, and are "made out of the solid." Sometimes they are drilled and then shaped by the cherry, but of late years they are forged in the drop die or at the anvil by sledge and round-nosed former. The office of the cherry is to perfect the crudely shaped cavity, and to finish its walls.

Usually these cherries are scored into flutings like those on the milling tool or the reamer, by means of a file, awkwardly worked over the curve of the cherry, particularly on the stem side, as there is no opportunity to pass the stem, unless the flutings are slashed (made diagonal) enough to pass the diameter of the stem. To diagonal flutings on any tool there are reasonable mechanical objections—straight flutings are always preferable. But it is difficult to form the flutings of a globular or an ovate cherry by means of a milling tool, even if it is mounted on a lathe arbor and fed by hand; the fluting of a cherry is essentially a hand job.

A tool maker ought to be able to use all sorts of tools; but there are few machinists who can use the graver. It is not to be expected that machinists should be experienced engravers, but it is well to know not only the object of hand tools, but also something of their method of being used. In this case of fluting cherries the graver is very useful; by its proper handling the flutings can be pushed, cleanly and evenly, over the rotundity of the cherry to the stem, making a clear cut. For this purpose a V-graver should be used, known to some workmen as a "routing tool."

It can be obtained at any engraver's supply store. There are many jobs where a deft use of the graver will be handy to the machinist tool maker. The writer owed a marked success in perfecting a peculiar tool in a machine shop to his acquaintance with the uses of the graver by an apprenticeship of four years in a shop of engraving for calico printing.

Jarrah Wood.

In the course of a recent lecture before the Society of Arts, London, by Mr. P. L. Simmonds, he spoke of the excellent qualities of the Australian tree known as the jarrah.

In the discussion which followed, Mr. Simpson said he was connected with the timber trade, having had thirty-two years' experience in Western Australia. The jarrah wood of that colony was acknowledged, by those who knew its qualities, to be about the next thing to everlasting, and he hoped that in the next year a few cargoes would come to England. Almost everything in Western Australia was made of this timber, workboxes, pianofortes, buildings, wharves, and jetties; it seemed to defy all known forms of decay, and was untouched by white ants and all other insects, so that ships built of it did not require to be coppered. It had been used above ground and below, in almost every situation in which timber could be placed, and was durable in all. On the table was a specimen from a tree cut thirty-two years ago, which had lain on the surface nearly all that time; it had been exposed to bush fires every two or three years, to the sun during the summer, to wind and rain during the wet season, and was as sound now as the day it was felled. Another piece he had cut from a small sapling used in a bridge at Bunbury, and so certified by the Government Resi-

dent, which had been thirty-six years in use, and this piece he had taken just between wind and water.

There were about fifteen varieties of the timber, and it could be obtained of any reasonable length up to 60 or 80 feet, the trunk of the tree having no branches whatever. Another advantage was that it did not burn freely, but only charred, which made it additionally valuable for building. It was poisonous to all insects, and when put into a white ants' nest they would not touch it. If a sheet of glass and a piece of this timber were put into such a nest, the ants would bore through the glass rather than touch the jarrah. The fresh sawdust put at the roots of a fruit tree would kill it, and it was stated by Baron Von Muller to contain not only tannic acid, but also sulphate of copper. Some of the wood was put into the Suez Canal seven years ago, and when examined lately was found as perfect as the day it was laid.

Mr. Cornish said he had seen jarrah timber in use in many places, partly in the wharves at Melbourne, where it was put in to replace the white and red gums which had been eaten through in the course of five to seven years; and the reports of the harbor master, and others, stated that it remained absolutely untouched. Some of her Majesty's ships which had been repaired with it when in Australia were found on examination in England afterward to have remained practically uninjured. For large works, such as the Suez Canal, piers, harbors, etc., it would be very valuable. The matter had been laid before the directors of the Suez Canal, with the view that if the canal were widened, and piled with this wood it would be practically everlasting. Jarrah would be equally valuable for use in the Manchester or Panama canal.

Mr. Simpson said he had known ships built of jarrah which had sailed for twenty or thirty years without any copper, and he himself was working lighters which had been in use fully that time, which had never been coppered. This timber would not grow on good soil, only where there was ironstone, tons weight of which were sometimes lifted by the roots. The more ironstone there was in the soil, and the higher the elevation, the better the trees grew.

It was one of the most remarkable facts connected with this timber, that if you put a bolt, no matter what size it might be, into it, when you took it out a bolt of precisely the same size would go into the hole again. The effect of the iron, apparently, was to preserve the timber, and of the timber to preserve the iron. He could not say what the action was, exactly, not being a chemist, but a slight black skin was formed between the two, and the iron appeared to remain as perfect as when put in. He had seen on the Fish Rock, at Fremantle, the whole of the guy chains supporting the beacon there entirely perished, and the copper fittings likewise, but the pole itself was found quite perfect, when examined, though it had been standing twenty-two years. Mr. Story, of Sunderland, and other shipbuilders, said jarrah was far superior to teak; it was less liable to split, and it would bend freely, and without being steamed.

ASPECTS OF THE PLANETS FOR FEBRUARY.

JUPITER

is morning star until the 19th, when he commences his course as evening star. An event then occurs in the sun's family which is of special interest to the inhabitants of this planet. For Jupiter in opposition is a high festival occasion, regarded with wonder and admiration by terrestrial observers. The Prince of Planets takes on his most glorious form, and plainly shows that he is the power behind the throne, the rival of the great luminary whom he more closely resembles than he does any of his brother planets. At opposition, Jupiter comes into line with the earth and the sun, the earth being in the center, so that we are at our nearest point to him, and he is consequently larger and more brilliant than at other times. The magnificent planet holds his state as far away from the sun as possible, rising proudly in the east as the sun sinks slowly in the west, reaching the zenith with stately step as the sun touches the nadir, and gradually fading out of sight in the west as the sun appears rejoicing in the east.

We never behold Jupiter in his present phase without being grateful that the earth's position in the system is inside instead of outside of the giant of the brotherhood, and that we can therefore see him shining in the east at eventide or looking down with friendly gaze from the midnight blackness of the sky. It always seems to us as if the oppositions in the sun's family, that bring the planets into closer companionship, are like birthdays in terrestrial families, and as worthy of being celebrated. They are festival days to those whose hearts are attuned to the harmony of the spheres, and who have learned to follow with enthusiastic interest the ceaseless wandering steps of the sun's family of worlds. For with this sun and with these worlds our own present existence and our future destiny are indissolubly linked. The opposition of Jupiter occurs on the 19th, at 2 o'clock in the morning. He will not, however, be in his most beaming phase, for he must be at or near perihelion, and in his highest northern declination, to be seen under the most favorable circumstances. These conditions do not occur until 1892. But ordinary oppositions like the present show our shining brother in charming aspect.

There is no end to the interesting problems waiting for solution in regard to Jupiter. Telescopists are never weary of studying the numerous and varied markings on his surface. New lines of his changing belts, dots on his disk, bright spots near his equator, huge rifts in his cloud atmosphere, occultations, transits of his satellites and their shadows, are scanned by eagle-eyed observers, accurately mapped by skillful draughtsmen, and laid away to swell the fathomless pile of observations that, one of these days, when the Jovian alphabet has found an interpreter, will reveal perhaps the details of the process of world-making going on in a planet so vast in bulk that its primeval fire still burns.

The great red spot visible for years on Jupiter has come and gone. Its appearance was a mystery. Its disappearance is equally unaccountable. It left behind an unsolved problem: visible proof of the equatorial acceleration of the planet. The bright spots near the equator made a circuit round the planet in about five minutes less time than the great red spot that was situated 40° from the equator. In precisely the same way the spots on the sun's equator complete a revolution in less time than those nearer the poles. Here is another link connecting the great central orb more closely with his lordly son, and placing him within the bounds of solar mysteries. When we find out the reason why the equatorial sunspots move faster than the polar ones, we shall learn why the Jovian bright spots moved faster than the great red spot. We shall probably be convinced at the same time that the royal planet is more nearly in the condition of the sun than are his less massive and less richly endowed brethren.

Meantime, those who do not care to discuss Jovian problems must improve the present favorable opportunity for a telescopic view of the majestic planet, stately in form, delicate in tone, varied in hue, and dignified in pose, as with serenely beaming face he seems to hang low in the heavens, so near the space annihilating glass that it seems as if one can almost touch his shining disk by putting forth the hand. Jupiter, when, millions of years hence, he becomes fitted for the abode of animate life, will doubtless be a pleasant dwelling place, but there are drawbacks to all finite enjoyment. We shall not look upon an abode on this favored planet with envious eyes when it is remembered that the future Jovians will have a sun only one twenty-fifth as large as the glorious orb that illumines our sky, and that he will be blessed with only one twenty-fifth of the heat and light freely poured upon the earth from the solar rays. If, by that time, the sun's fires grow dim, the prospect of comfortable existence there will not be alluring for beings constituted like the human race.

The right ascension of Jupiter on the 1st is 10 h. 21 m., his declination is 11° 32′, his diameter is 42·4″, and he may be found in the constellation Leo.

Jupiter rises on the 1st about 7 o'clock in the evening; on the 28th he sets not far from a quarter after 6 o'clock in the morning.

MARS

is evening star until the 11th, when he joins the ranks of the morning stars. On the 11th, at 7 o'clock in the evening, he is in conjunction with the sun, reversing the role played by his brother planet Jupiter, thus illustrating almost side by side the two great epochs of the outer planets, conjunction and opposition. Mars is in line with the sun and the earth, but with the sun in the middle, being, to terrestrial observation, beyond the sun and as far from the earth as possible. He is at the same time in conjunction, or "joined to" the sun, rising and setting with the sun and completely hidden in his bright beams.

MARS,

after conjunction, passes to the sun's western side, and commences his role as morning star, and, at the same time, turns his steps toward opposition, which he will not reach till March, 1886. For months to come he will be of little account, insignificant in size, and close to the sun. Indeed, he never counts for much, excepting for a month before and after opposition, while oppositions specially favorable occur only at intervals of fifteen years. In 1892, when the next opposition rolls round under the best auspices, it may be discovered that his two tiny moons, first known as members of the system in 1877, are nothing but captured asteroids. Mars is in perihelion on the 28th. He is then 26,000,000 miles nearer the sun than in aphelion, but is so far away that we gain nothing by the occurrence of the epoch.

The right ascension of Mars on the 1st is 21 h. 11 m.; his declination is 17° 21′ south; his diameter is 4·2″; and he may be found in the constellation Capricornus.

Mars sets on the 1st about a quarter after 5 o'clock in the evening; on the 28th he rises about half past 6 o'clock in the morning.

NEPTUNE

is morning star throughout the month. He reaches an important time-mark in his course. On the 8th, at 9 o'clock in the evening, he is in quadrature with the sun on his eastern side, half his course from opposition to conjunction being completed. If we had eyes to see our most distant brother planet at quadrature, he would be visible at sunset, looking down from the meridian, just 90° east of the sun.

The right ascension of Neptune on the 1st is 3 h. 14 m.; his declination is 16° 12′ north; his diameter is 2·6″; and he is in the constellation Taurus.

Neptune sets on the 1st about half past 1 o'clock in the morning; on the 28th he sets about half past 11 o'clock in the evening.

VENUS

is morning star. Her luster grows dim, and her size diminishes as she draws nearer the sun, and rises later every morning. She is still beautiful to behold as she makes her appearance in the morning dawn an hour before sunrise. Her diameter is now but 11·2″, against 64″ at the time of her inferior conjunction. We see, however, a much larger portion of her illumined disk than she turns toward us when at her period of greatest brilliancy. Seen in the telescope, she is now in gibbous phase, like the moon approaching the full. If, when nearest to the earth, she could take on her present aspect, our sky would show a planet glorious to behold.

On the 11th, at 7 o'clock in the evening, Venus is in conjunction with Mercury, being 44′ north. The conjunction is invisible, but the planets will not be far apart on the morning of the 12th, when perhaps an opera glass will be a successful assistant in picking up Mercury.

The right ascension of Venus on the 1st is 19 h. 32 m.; her declination is 21° 52′ south; her diameter is 11·2″; and she is in the constellation Sagittarius.

Venus rises on the 1st not far from 6 o'clock in the morning; on the 28th she rises at nearly the same time.

MERCURY

is morning star, and keeps near Venus during the whole month. On the 1st he makes his transit five minutes earlier than Venus, on the 11th at the same time, and on the 28th he is twenty-four minutes behind his fairer companion. He is in conjunction with Venus on the 11th, as already stated.

The right ascension of Mercury on the 1st is 19° 27′; his declination is 22° south; his diameter is 6″; and he is in the constellation Sagittarius.

Mercury rises on the 1st a few minutes before 6 o'clock in the morning; on the 28th he rises about half past 6 o'clock.

SATURN

is evening star. Though he contributes no incident to enliven the annals of the month, he takes the second place among the twinkling mysteries that stud the winter sky. He remains through the month in a position so nearly stationary that he may easily be mistaken for one of the distant suns that beam from the star depths. A careful observer, however, will notice the softness and serenity of his light, in striking contrast with the twinkling of his companions, thus showing that he is a planet, and shines by reflected light.

The right ascension of Saturn on the 1st is 5 h. 6 m.; his declination is 21° 32′ north; his diameter is 18·6″; and he may be found in the constellation Taurus.

Saturn sets on the 1st about half past 3 o'clock in the morning; on the 28th he sets about a quarter before 2 o'clock.

URANUS

is morning star, and drawing near to opposition, the last of the four giant planets to reach the point where they are most interesting to terrestrial observers. At the close of the month, Venus, Mercury, Uranus, and Mars are morning stars; Neptune, Saturn, and Jupiter are evening stars.

The right ascension of Uranus on the 1st is 12 h. 10 m.; his declination is 0° 20′ south; his diameter 3·8″; and he is in the constellation Virgo.

Uranus rises on the 1st at half past 9 o'clock in the evening; on the 28th he rises at half past 7 o'clock.

THE MOON.

The February moon fulls on the 28th, at 11 o'clock in the evening, so that we shall come within an hour of having no full moon in February. The moon is in conjunction with Uranus on the 3d, three days before her last quarter. She is in conjunction with Venus on the 13th at 18 minutes after 5 o'clock in the morning, and is at her nearest point to Mercury on the same morning, 24 minutes later. She is in conjunction with Mars on the 14th, the day of her change, with Neptune on the 21st, with Saturn on the 23d, and with Jupiter on the 28th.

The moon occults a few small stars as she speeds on her course during the month, but a telescope is required for observing these occultations.

She occults the planet Uranus on the 2d, but the phenomenon will be invisible on this portion of the globe. Observers under favorable conditions between the limiting parallels of 37½ and 90° southern latitude will have the opportunity of seeing our satellite hide from view the small sea-green orb that marks the presence of Uranus in the heavens. A good telescope will be required for the observation, as this planet is only visible to the naked eye as a star of the sixth magnitude when near opposition.