### POSITION OF THE PLANETS IN FEBRUARY.

VENUS

is evening star. She is the gem of the star-lit February sky, and is seen under most favorable conditions, coming toward us, thus increasing her diameter, and oscillating eastward from the sun, thus lengthening her stay above the horizon. Though less of her illumined disk is turned to the earth as she advances in her course, the loss is more than counterbalanced by her greater diameter, and her brilliancy steadily increases. To complete the list of her attractions, she is moving northward, and, when the month closes, her declination is 7° 28′ north.

The most interesting event on the February record is the close conjunction of Venus and Jupiter on the 6th at 5 h. 8 m. A. M., when Venus is only 1′ south of Jupiter. A minute of arc is a tiny bit of sky, and the planets would seem to make an appulse, or touch each other, if we could see them, but they are below the horizon at the time of the conjunction. Observers will, therefore, have to be contented with a view of the planetary rivals on the evenings of the 5th and 6th, when they are near together, and form a charming celestial picture. On Friday, the 5th, at 7 h. P. M., Venus is 21′ of arc west of Jupiter, a space about equal to two-thirds of the diameter of the moon. On Saturday, the 6th, at 7 h. P. M., Venus is 40′ east of Jupiter, showing that the conjunction has occurred, and that the planets have changed places, and are receding from each other. The planets set about 8 o'clock on the evening of the 5th, and the distance between them will lessen as long as they are visible. The conjunction will be visible with the aid of a telescope to observers far enough east of us to trace the planets above the horizon at the time of the conjunction at Greenwich, for instance, where it occurs at 10 h. A. M.

The conjunction comes near being an occultation, a very rare occurrence between two planets, of which there are few instances on record. The moon occults every month all the stars and planets that lie in her pathway. Planets sometimes occult stars, but a planet occulting a planet, or even coming as near as Venus does to Jupiter, is a phenomenon to be remembered for a lifetime. Observers on this portion of the earth's domain will greatly regret that our celestial neighbors did not choose a more favorable hour for the exhibition, and give us an occultation instead of a conjunction.

The right ascension of Venus on the 1st is 23 h. 7 m., her declination is 7° 4′ south, her diameter is 13″.0, and she is in the constellation Aquarius.

Venus sets on the 1st at 7 h. 51 m. P. M. On the 29th she sets at 8 h. 55 m. P. M.

JUPITER

is evening star. His course in that role is nearly finished, for he is drawing near the sun and will soon become eclipsed in the sunbeams. He sets about an hour later than the sun when the month closes. Observers in January watched with eager interest the approach of Venus and Jupiter. They will watch with greater enthusiasm during the present month the conjunction of the bright planets, or what can be seen of it, and their subsequent recession from each other, so that at the close of the month they are 20° apart. A remarkable coincidence intensifies the importance of this rare phenomenon. Venus and Jupiter were in conjunction on July 20, 1859, at 10 h. 38 m. P. M., Venus being 1′ south of Jupiter. The distance between the planets was exactly the same as in the present case, although their position in regard to the sun was entirely different.

The moon makes two conjunctions with Jupiter in February. The two-days-old crescent is in conjunction with Jupiter on the 1st at 3 h. 36 m. A. M., being 3° 42′ south. The one-day-old crescent is in conjunction with Jupiter on the 28th, at 11 h. 40 m. P. M., being 3° 19′ south.

The right ascension of Jupiter on the 1st is 23 h. 24 m., his declination is 5° 8′ south, his diameter is 33″.0, and he is in the constellation Aquarius.

Jupiter sets on the 1st at 8 h. 59 m. P. M. On the 29th he sets at 6 h. 59 m. P. M.

SATURN

is morning star. He is now coming into notice as the bright star in the east, rising about 8 o'clock on the middle of the month, and may be found about 19° northwest of Spica.

The moon is in conjunction with Saturn on the 15th, at 10 h. 54 m. A. M., being 1° 40′ north.

The right ascension of Saturn on the 1st is 12 h. 3 m., his declination is 2° 20′ north, his diameter is 17″.8, and he is the constellation Virgo.

Saturn rises on the 1st at 9 h. 3 m. P. M. On the 29th he rises at 7 h. 5 m. P. M.

MARS

is morning star. Observers who wish to obtain a glimpse of the ruddy star, soon to play an important part in celestial economy, will find him on the 1st 3° southeast of Beta Scorpii, rising about half past 2 o'clock. An opera glass will bring him into the field of view.

The moon is in conjunction with Mars on the 22d, at 2 h. 21 m. A. M., being 2° 39′ south. The conjunction occurs very near the time when Mars rises.

The right ascension of Mars on the 1st is 16 h. 12 m., his declination is 20° 33′ south, his diameter is 6″.2, and he is in the constellation Scorpio.

Mars rises on the 1st at 2 h. 38 m. A. M. On the 29th he rises at 2 h. 11 m. A. M.

MERCURY

is morning star. His course is uneventful as he makes his way from western elongation to superior conjunction with the sun.

The right ascension of Mercury on the 1st is 19 h. 37 m., his declination is 22° 19′ south, his diameter is 5″.6, and he is in the constellation Sagittarius.

Mercury rises on the 1st at 6 h. 6 m. A. M. On the 29th he rises at 6 h. 36 m.

NEPTUNE

is evening star. Observers will look for him 2½° northwest of Aldebaran, his position changing little during the month. A good telescope is required to obtain a good view of him, though he has been seen with the aid of an opera glass by a practiced observer.

The right ascension of Neptune on the 1st is 4 h. 19 m., his declination is 19° 48′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune sets on the 1st at 2 h. 41 m. A. M. On the 29th he sets at 0 h. 51 m. A M.

URANUS

is morning star. His right ascension on the 1st is 14 h. 15 m., his declination is 13° 4′ south, his diameter is 3″.6, and he is in the constellation Virgo.

Uranus rises on the 1st at 0 h. 14 m. A. M. On the 29th he rises at 10 h. 19 m. P. M.

Venus, Jupiter, and Neptune are evening stars at the close of the month.

Mercury, Saturn, Mars, and Uranus are morning stars.

### The Aluminum Light.

A very intense light, such as is required for photographic or occasionally for medical purposes, may, as is well known, be readily obtained by burning magnesium ribbon, which has, however, the disadvantage of being somewhat expensive. An excellent substitute has been found by a French chemist, M. Villon, in aluminum, which is about a third of the price of magnesium, and which may be utilized in the same manner by burning it in a spirit lamp, or, if a flame of much more intense brilliancy is required, in a coal, gas, or spirit flame supplied with a jet of oxygen. In these it burns without emitting fumes, in which respect it is superior to magnesium. The light given by aluminum has a high actinic power—nearly as high, indeed, as that of magnesium. The most convenient way of obtaining a very intense light, according to M. Villon, is to use a lamp provided with a jet of oxygen at the center of its flame, into which powdered aluminum mixed with a quarter of its weight of lycopodium and a twentieth of its weight of nitrate of ammonium can be projected by means of a tube furnished with an air ball. This gives an exceedingly intense light, without smoke. A mixture of aluminum powder with chlorate of potash and sugar can be ignited, giving an intense light, by means of gun cotton, but is somewhat dangerous. Probably the best plan, says the *Lancet*, for medical photography, or for laryngoscopic and auroscopic and other demonstrations, would be to burn a ribbon of aluminum in an ordinary spirit lamp. Of course, if oxygen and an oxy-hydrogen, or an oxy-alcoholic, lamp were at hand, a much more intense light could be obtained.

### An Inventor Elevated to a Peerage.

If ever a peerage is the fit reward for scientific eminence, says *The Builder*, London, never was that distinction better bestowed than on Sir William Thomson, president of the Royal Society, on whom the British Queen has just conferred the title. The days are past when a man could say with Bacon, "I have taken all knowledge to be my province;" nor is it now possible even to so take all science, but Sir Wm. Thomson may justly claim to have taken all physical science as his province, and there are few who can rival him in any one branch of it. Go where you will, we find traces of his restless activity. Every telegraph office is stocked with instruments of his invention; a large part of London is lighted by dynamo machines which are modifications of one of his; and in the test rooms of all the installations in the world the most accurate instruments are his also. We go to sea, and we find the means of taking soundings without stopping the ship, designed by Sir William Thomson; we arrive in port, and find the height and time of the tides predicted by Sir William Thomson's tidal clock. Perhaps we are interested in questions of speculative science—the age of the earth, the constitution of matter and the size of its ultimate molecules, the origin of life on the earth and its probable duration; none of these questions can be adequately discussed without mention of his name, and on some of them he is the only authority. In collaboration with Professor Tait he has written what is generally accepted as *the* text book on natural philosophy, and some of the most brilliant mathematical investigations we have ever seen are due to him. When the history of science in the nineteenth century comes to be written, three names will stand out pre-eminent, those of Faraday, Darwin, and Sir William Thomson.

### Mineral Production of the United States for 1891.

A recent number of the *Engineering and Mining Journal* presents the official returns of production during 1890 and 1891 of nearly all the important minerals and metals, and a comprehensive statement of the sources of production, the occurrence of the minerals, the uses and values of their products, and in many cases the stocks of metal on hand at the close of the year.

These statistics have been compiled with the greatest possible care, neither labor nor expense being spared to secure accuracy in every particular.

The statistical reports given would form a book of about 450 pages.

We make the following abstracts: There have been no discoveries of great bonanzas, no mining "booms," during the year 1891, but the mining industry never was more prosperous, and its prosperity never before was founded on so substantial a basis. Large investments have been made in mining, and for the most part with prudence. Under competent and honest management these investments are making highly satisfactory returns. The dividends declared by mining companies during the year 1891 were much greater than for many years past, and represent a better return on the money actually invested than ever before in the history of mining in this country.

The immense increase during 1891 in production of most of the metals has been a surprise. Copper in particular will, as usual, astonish the trade. The consumption of metals increases steadily, as might be expected from the growing wealth and prosperity of the country. Almost the only article which has fallen off has been steel rails, and with it pig iron. In this instance the financial condition of the railroads was the cause; while where consumption is made up of the purchases in small and various forms by the people at large, it steadily increases unless checked by very high prices. During the year 1891 prices were generally low and the people prosperous; they consequently purchased freely.

Nothing more forcibly demonstrates the absurdity of our barbarous system of weights and measures than the compilation of statistics. We have tons of 2,240 pounds, of 2,000 pounds, and the metric ton of 2,204½ pounds, or 1,000 kilos, to say nothing of the other special tons used in certain industries. We have ounces troy and avoirdupois, and grains and grammes, with innumerable other weights. It is indeed high time that all civilized countries adopt the single metric standard of weights and measures—in which case the statistics compiled in one country will be available for comparison elsewhere without necessitating the laborious recalculation from one system into the other.

MINERAL PRODUCTION OF THE UNITED STATES IN 1890 AND 1891.

| | 1890. | 1891. |
|---|---|---|
| Gold, ounces | 1,588,880 | 1,620,000 |
| Silver, ounces | 54,500,000 | 58,000,000 |
| Pig Iron, tons of 2,000 lb | 10,307,028 | 8,976,000 |
| Steel Rails, tons of 2,240 lb | 2,095,996 | 1,090,000 |
| Copper, lb | 264,920,000 | 292,620,000 |
| Lead, tons of 2,000 lb | 181,494 | 205,488 |
| Zinc, tons of 2,000 lb | 66,342 | 76,500 |
| Nickel, lb | 200,332 | 144,841 |
| Quicksilver, flasks | 22,926 | 21,022 |
| Aluminum, lb | 94,881 | 163,820 |
| Tin, lb | ........ | 123,366 |
| Antimony Ore, tons of 2,240 lb | ........ | 700 |
| Anthracite Coal, tons of 2,240 lb | 38,006,483 | 42,839,799 |
| Bituminous Coal, tons of 2,240 lb | 93,000,000 | 98,000,000 |
| Phosphate Rock, tons of 2,000 lb | 637,000 | 659,731 |
| Salt, bbls. of 280 lb | 9,727,697 | 10,229,691 |
| Bromine, lb | 310,000 | 415,000 |
| Pyrites, tons of 2,000 lb | 109,431 | 122,438 |
| Sulphur, tons of 2,000 lb | ........ | 1,200 |

The iron industry suffered a severe "set-back" during the past year, when the make of pig iron declined from 10,307,028 tons of 2,000 pounds, in 1890, to 8,976,000 in 1891, these figures being obtained from official returns made throughout the year. This heavy falling off was caused chiefly by the decline in the make of steel rails from 2,095,996 tons of 2,240 pounds in 1890 to 1,090,000 tons in 1891—a decline due partly to the poverty of the railroads and partly to the comparatively high price established by the steel rail association.

In phosphate rock, in pyrites, in salt, in aluminum, in copper, lead and zinc there has been a very considerable increase in output, while tin, antimony ore and sulphur enter the list with modest but promising beginnings.

THE Venezuela, belonging to the Red D Line, is the first vessel built under the provisions of the postal subsidy act of the last Congress. She has been tested under the supervision of a naval board and made 15¼ knots average on a four-hour trip. The board reports that she complies with the government requirements.

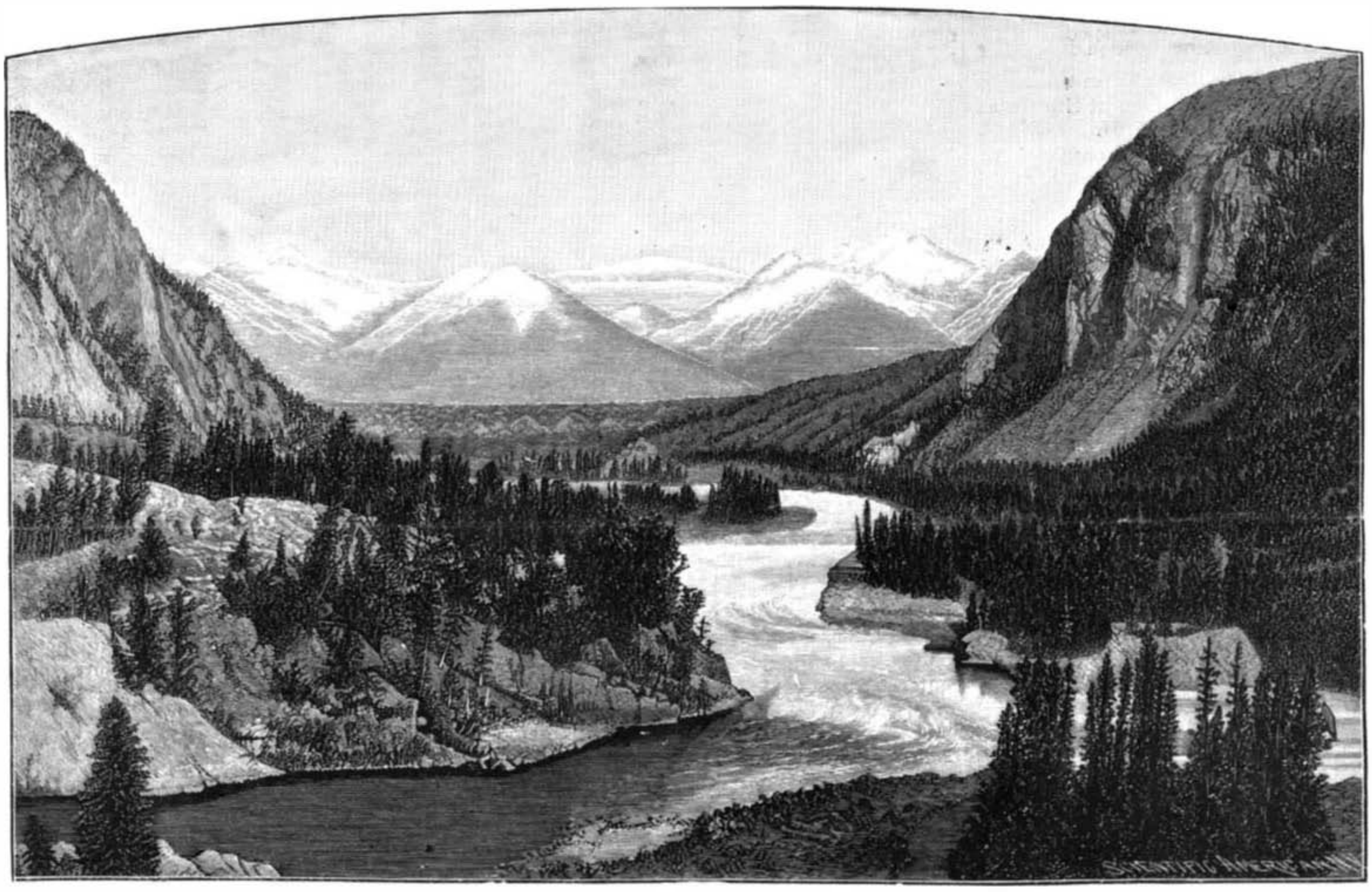
### The Incandescent Lamp as a Test for Stability.

It was used recently by Mons. F. Leconte at the Institut des Sciences de Gand. He required to verify the stability of the stone supports which rest upon the foundations in the Laboratory of Physics there. Upon one of these supports he placed a telescope, and upon the other a Khotinsky lamp, and he made such dispositions and arrangements that the vibrations of the filament could readily be observed through the telescope. He waited about ten minutes until there was complete repose, and then gave several sharp taps upon the floor of the laboratory, noting the number of seconds taken by the filament in again coming to the state of rest. The usual mercury tests were entirely incompetent to show vibrations which the incandescent lamp readily responded to. With a little care this test of stability might be made of a quantitative nature, and thus its usefulness would be greatly enhanced.

### LOWER BOW PARK, BANFF.

Throughout long stretches of travel over the Canadian Pacific Railway the scenery is flat and unattractive; but as from the eastward we approach the Rockies, many scenes of extraordinary grandeur are presented to the view. The neighborhood of Banff, where healing hot springs are found, is especially rich in river and mountain wonders. We give for an example a prospect at Lower Bow Park, where the river passes between two towering masses of granite; dense forests in the distance, above which rise to enormous heights the snow-capped heads of western giants, bewildering in number and furrowed with glistening glaciers of immense extent. How the railway was ever carried through so many and such dangerous defiles as this region presents is the wonderment of every traveler.

The Canadian Pacific Railway may be said to extend in one continuous line from Halifax, on the Atlantic, to Vancouver, on the Pacific, a distance of about 3,650 miles, being the longest line of railway under one organization in the world.



CANADIAN PACIFIC RAILWAY—LOWER BOW PARK, BANFF.

### Action of Superheated Steam on Clay.

Mr. E. Meyer, of Berlin, claims to have devised a process whereby hydrate of alumina may be obtained directly from silicates of alumina or clay. The process is said to be based on the hitherto unknown property possessed by superheated steam of exerting a decomposing action upon silicates of alumina (inclusive of those combined with iron or ferro-silicates) or clay, in such a manner that the metallic substances (such as alumina, oxide of iron, lime, and alkalies) which they contain become converted, with separation of silicic acid, into water-soluble hydrates. The superheated steam acts upon the materials, which must be in a state of division, with equal effect whether the said materials are in a dry or a wet condition. The present process consists in bringing superheated steam (preferably heated by means of red hot iron surfaces) into intimate contact with finely divided silicate of alumina or clay, dissolving the hydrates formed and obtaining the hydrate of alumina therefrom by precipitation.

### Manufacture of Kid Gloves.

The first thing to do is, of course, to remove the hair from the raw skins, and for this purpose lime is used, they being immersed from a fortnight to three weeks in pits containing water and lime. The skins are constantly turned and shifted about by workmen armed with long iron tongs, and when taken out it is found that the lime has loosened the cuticle of the skin, thus rendering the removal of the hair a more easy matter. From the lime pits the skins are taken to the unhairing room, where they are stretched on a sort of wooden block, and are scraped with a blunt two-handled knife. This removes the hair. They are now taken in hand by the "flesher," who cuts off the tail, the head piece, and such portions of adipose matter as may still adhere to the skin. The waste is useful for the manufacture of glue and gelatine, the hair removed by the former process being used for mortar and for felt making.

The skins now pass on to the "scudder," who removes any hair that may have hitherto escaped the knives of the previous operators. They are next left to soak in clear water, to remove all traces of the lime, and from thence they undergo a process of artificial fermentation, called by the French "mise en confit"—that is to say, they are placed in a mixture of warm water and bran, which not only removes any fleshy impurity from the skins, but also renders them soft and supple. Kid skins are not tanned like ordinary leather, such as used for making boots or harness, by means of oak bark, but are immersed in a large revolving "drum," which contains a mixture composed of yolk of eggs, wheaten flower, alum and salt; and so enormous is the consumption of the former ingredient that at one factory in Chaumont no fewer than 4,000 eggs are needed every day. The skins are allowed to remain in this costly paste for rather more than an hour, the drum being kept revolving by means of machinery.

They are next taken out, and removed to the cellars for the night, and from thence are conveyed on the following day to the drying room, where they are subjected to a temperature varying from 140° to 160°. The attendants in this room are clad in a garb similar to that of the peasantry of India, so intense is that heat; but they manage, nevertheless, to enjoy good health, and sometimes even to increase in weight. Each skin is hung separately on hooks, and thus they dry very quickly. This process leaves them somewhat hard, and they are next "seasoned" or "sammied" with cold water, and then stretched backward and forward over upright knives, shaped like a half moon. After being wetted again they are "shaved," a process requiring great dexterity. This is accomplished by means of specially constructed knives which remove the under flesh. The skins are now coated with a composition of flour, oil, and yolk of eggs, which make them soft and pliable. They are then conveyed to the dyehouse, being by this time ready for the preliminary operations of dyeing.

Before being dyed the skins are trodden under foot for several hours in water. This process throws out of them anything which would be opposed to the action of the dye. Having been rinsed, the skins are now moistened with more yolk of eggs, and are allowed to rest a day before they are dyed by the workmen, who, taking a brush dipped in ammonia, spread it over the skins, and then apply several coatings of the dye. For skins that are dyed on both sides of course another process is employed. The workmen place the skins in a large vat, and while treading them down pour in the coloring liquid. Those that are intended for black gloves show, after their first dip in the dye, a bluish tinge, but this is worked off until the skins present a brilliant and perfect black. This process is called "lustering," and is done by passing a sponge over the skins, which have been dipped in a mixture of oil and soap. They are then stretched over rolls of flannel until quite dry.

The skins which have been dyed are now subjected to a process known as "grounding," the object of which is to remove all roughness, and render them thinner and more supple. They are next sorted according to their quality and size, and are passed on to the cutters, who cut them into the several detached parts of gloves. This operation may seem to the unskilled very easy, but it requires great judgment, for the workman has to allow for the natural stretch of the skin. The finished skins having been selected and mapped out by the sorters are put over a frame looking like a deformed glove. These frames are so made that they represent the whole glove laid out unsewn. The gloves, with the thumbs duly fitted and put together, are placed in a press, after which they are sent to be punched by means of machinery. The cuttings left by the punching machine are picked with scissors by girls who are called "raffleuses," while those employed making the "fourchettes," or side pieces for the fingers, which are also cut out by the bunch, are called "fourchettiers." It is, of course, necessary that the "fourchettes" should match exactly with the other parts, and for this purpose "sorters" are employed to choose them. The edges of the gloves are refolded by machinery, and are then ready for sewing. In France the work of stitching is done mostly by hand, although there are some very ingenious machines invented to perform this operation. One firm alone employs no fewer than 4,500 women and girls for this branch.

The fastenings are now attached by means of rivets, which are hammered by the girls called "riveuses." The glove has now been sewn and furnished with buttons. It only remains to straighten it by placing it on a glove stick. The gloves are then arranged in dozens, and being enveloped in paper bands are packed in card boxes ready to be dispatched from the factory.

IT has been decided to work the Liverpool Elevated Railway by electricity, using motor cars, instead of separate locomotives. The line is six miles long, and the generating station is being erected near the middle of the railway. There are several opening bridges, and the structure is composed entirely of iron and steel, spanning for the most part the existing dock railway, which will thus be left free for the goods traffic of the docks.