ASPECTS OF THE PLANETS FOR APRIL.

VENUS

is morning star, and takes the lead of the planets that sing and shine while they anticipate the rising of the great luminary that will eclipse their lesser light. She is still traveling on the eastward track that brings her nearer to the sun, as she fulfills her course from western elongation to superior conjunction. Though her fair face is becoming "fine by degrees and beautifully less," she continues to grace the breaking of the dawn, and wins the admiration of every observer who watches her progress "under the opening eyelids of the morn."

Venus varies her course with an incident on the 10th. She is in conjunction with Lambda Aquarii, a star of the fourth magnitude in Aquarius, being twenty-six minutes south of the star. The nearest approach is at eleven o'clock in the morning. But planet and star will be near enough before sunrise to form an interesting picture. Venus will be far enough above the horizon for favorable observation soon after four o'clock, and will then be seen west of the star and approaching it. On the morning of the 11th, it will be seen that planet and star have passed each other, Venus being east of the star. Observers will note the rapid progress of Venus northward. At the end of the month she will be in northern declination, nearly twelve degrees farther north than at the beginning of the month.

The right ascension of Venus is now 22 h. 10 m., her declination is 11° 37′ south, and her diameter is 16·8″.

Venus rises on the 1st eight minutes after four o'clock in the morning; on the 30th she rises at thirty-eight minutes after three o'clock.

MARS

is morning star, but is too near the sun and too insignificant in size to be of much account. A better time is coming, and, before many months have passed, he will become an object of prominent interest as he approaches opposition. Like Venus, he is moving rapidly northward. At the close of the month he will be in northern declination, having traveled nine degrees north during the month. The farther north the planets are in this latitude, the more favorably they are situated for observation, and the longer is the circuit they make above the horizon.

The right ascension of Mars is 23 h. 6 m., his declination is 6° 57′ south, and his diameter is 4·3″.

Mars rises on the 1st at ten minutes before five o'clock in the morning; on the 30th he rises a quarter before four o'clock.

MERCURY

is morning star until the 16th, and evening star for the rest of the month. On the 16th, at six o'clock in the morning, he is in superior conjunction with the sun, passing behind the great luminary, and appearing on his eastern side to play his short role of evening star.

He is an active member of the solar community. On the 27th, rushing eastward, at full tilt, with a seeming intention to get as far away from the sun as possible, he encounters Neptune, plodding westward with tortoise pace, making every effort in his power to approach the sun as near as possible, the former moving with a velocity of nearly thirty miles a second; the latter moving with a velocity of three miles and a half in a second. They have a conjunction at the respectful distance of 3° 7′, and are hidden from terrestrial gazers by their near proximity to the sun. They, however, win distinction, for the meeting of the planet that travels nearest to the sun and the one that travels on the system's remotest bounds is the sole planetary conjunction on the meager annals of the month. Mercury is speeding north faster than either Venus or Mars, for during the month his northern declination increases twenty-three degrees.

The right ascension of Mercury is 23 h. 59 m.; his declination is 2° 33′ south, and his diameter is 5·6″.

Mercury rises on the 1st at twenty-one minutes past five o'clock in the morning; on the 30th he sets at twelve minutes past eight o'clock in the evening.

NEPTUNE

is evening star, and leads the quartett of giant planets in the time of rising and setting. He is now so far from the earth, and so near the sun, that large telescopes find it difficult to pick him up, but his course among the stars is as accurately mapped out as if he were visible to the unaided eye. His conjunction with Mercury has already been referred to.

The right ascension of Neptune is 3 h., his declination is 15° 19′ north, and his place is in Taurus.

Neptune sets on the 1st at a quarter after nine o'clock in the evening; on the 30th he sets at half-past seven o'clock.

SATURN

is evening star, and shines in the western sky for about three hours after sunset, when his pale disk dips below the horizon. He is now nearly south of the Pleiades, and presents no features of special interest to the ordinary observer. Even the telescopist will have to take a season of rest, for he is approaching the sun so closely that he will soon be hidden from view. Hidden, but not lost, for next autumn at opposition he will be more magnificent than he was during the past autumn and winter.

The right ascension of Saturn is 3 h. 26 m.; his declination is 16° 49′ north; his diameter is 16″, and he may be found in the constellation Taurus.

Saturn sets on the 1st about a quarter before 10 o'clock in the evening; on the 30th he sets at twelve minutes past 8 o'clock.

JUPITER

is evening star, the third in the order of rising, but he holds the palm among the planets and the myriad stars as the most brilliantly beautiful of the shining host. He distinguishes himself by no noteworthy deeds, but pursues the even tenor of his way with majestic mien, accepting with royal grace the honors due to his position as the giant member of the system, the finest exemplification of nature's fashioning hand.

The right ascension of Jupiter is 5 h. 36 m.; his declination is 23° 15′ north; his diameter is 35 2″; and his place is in Taurus.

Jupiter sets on the 1st at twenty-five minutes past 12 o'clock in the morning; he sets on the 30th a few minutes before 11 o'clock in the evening.

URANUS

is evening star, and may still be seen by the unaided eye as a faint star in clear weather on moonless nights. His position varies little from that pointed out for March, being half a degree farther north. He is in Virgo, a little northwest of Beta Virginis, and may be best observed in the east about 8 o'clock.

The right ascension of Uranus is 11 h. 26 m.; his declination is 4° 31′ north; and his diameter is 3·8″.

Uranus sets on the 1st at 5 o'clock in the morning; he sets on the 30th at five minutes past 3 o'clock.

THE MOON.

The April moon fulls on the 22d, at forty-three minutes past 6 o'clock in the morning. The old moon is in conjunction with Venus on the 4th, Mars on the 5th, and Mercury on the 6th. The new moon of the 7th is near Neptune and Saturn on the 9th. The conjunction with Saturn will be the most interesting phenomenon of the month, the two days' old crescent passing forty-one minutes north of the planet, and the time of nearest approach being about a quarter after 8 o'clock in the evening. The conjunction is much closer than that of the 13th of February, when the moon and Saturn, imprisoned in the halo surrounding her, formed a charming celestial picture. On the 13th the moon is in conjunction with Jupiter, and on the 18th completes the planetary circuit by drawing near to Uranus. On the 22d the moon is eclipsed. The eclipse is invisible in this portion of the world, but may be seen on the Pacific coast, the Pacific Ocean, and Asia. Observers here will not lose much, for less than one-tenth of the moon's diameter will be eclipsed. The moon occults Beta Capricorni, a star of the third magnitude, on the 1st at seven minutes after 6 o'clock in the morning, the star being hidden for twenty-two minutes. The occultation takes place soon after sunrise, and is invisible, but the near approach of moon and star will afford material for interesting study.

SOME ANSWERS TO CORRESPONDENTS.

E. H. P.—"Luminous paint" is used to illuminate the faces of clocks and watches. It is a compound of lime and sulphur in varnish.—R. H.—There is no difference, in result, between one square foot and one foot square. One square foot may be contained in a figure of any desired shape containing 144 square inches; for example, a parallelogram 24 inches long and six inches wide; while one foot square is understood to represent a figure measuring 12 inches on each of its sides.—O. R.—The top of a locomotive wheel does not go around its axle, when running, any faster than the bottom of the wheel.—S.—Will take no more pickets to fence the hill than to carry the fence on the straight line shown in your diagram.—H. B. L.—The cannon ball fired from the rear of a train moving sixty miles an hour will pass the mile post.—J. A. M.—The profession of civil engineering offers inducements for young men to study. There are good colleges and many good books relating to engineering.—O. R.—You cannot run an electric light without considerable expense for machinery or for batteries.—W. D. T. Ordinary nut coal is the best for the purpose.—G. R. B.—Butter can be made from fresh milk by means of an ordinary churn.—J. L. B.—Railway ties made of paper pulp have been proposed.—H. S.—The best method of preserving and transporting fresh fruit is by means of the refrigerator cars. Splendid fruit is thus brought from California to the New York market.—F. E. S.—Solid iron columns are stronger than hollow iron columns of the same diameter; but the same weight of metal that is contained in the solid column, if it were put into the form of a hollow column, would be much stronger than the solid column.—J. W. P.—Better write to the Secretary of the Interior.—C. R.—There are various forms of sheep shears made with guards to prevent injury to the sheep.—C. L. F.—One way to make electrical belts is to sew a strip of copper and a strip of zinc inside of the cloth in such a manner that the zinc and copper will both be in contact with the surface of the skin. An amateur can produce good pictures with a portable photographic apparatus, such as you speak of.—There is no simple photo-engraving process, such as you call for.—F. S. M.—There is no especial place where you can go to study inventing. As for mechanical electricity, the best way will be to attend some polytechnic school.—S. R.—You can buy rubber cement at the drug stores.—C. T.—The nineteenth century closes December 31, 1899, and the twentieth century commences January 1, 1900.—E. C. B.—There is no way to prevent the lead from coming off.—F. C. K.—Powder exploded on the top of a rock under water will break up the rock; but a more economical mode is to drill the rock with the ordinary submarine drills, and then blast it in the usual way.—E. C. S.—You will find descriptions of cork machinery in the back numbers of the SCIENTIFIC AMERICAN.—J. A. R.—The cost to erect an electrical telephone for three miles, instruments, poles, wires, and all included, would be about $150 per mile.—A. C. L.—Dentiphones, or audipbones, are made in this country.—H. S.—See SUPPLEMENT, 357, electrical balance for showing presence of metals under surface of the ground. There is no other instrument for indicating the existence of precious metals.—E. L. R.—The Edson automatic steam recorder will tell you whether your fireman does his duty at night.—A. L.—For drawings of a timber drying apparatus see recent number of SCIENTIFIC AMERICAN SUPPLEMENT.—G. M.—Various forms of nut locks are in use.—T. A. M.—You can obtain the telescope glasses at almost any optical store.—W. E. M.—Common whiting and alum in equal parts makes a good filling for safes.

Steel from Phosphorized Cast Iron.

A paper by M. Delafond has recently appeared in the *Annales des Mines* on the preparation of steel from iron of this kind, and he finds that the problem is completely solved, both in the Bessemer converter as well as in the ordinary furnace, when basic linings of magnesian lime are employed. The removal of phosphorus is as satisfactory as could be desired, and the silicium is almost entirely removed, while the sulphur is also to a great degree separated. The basic steel is found to be purer and more uniform in texture than acid steel. The soundness of basic steel is more uniform than that of acid steel. Tires of both are found to be statically and dynamically alike. The formation of bubbles and blisters in the basic ingots has been avoided by raising the temperature before casting. In the furnace the basic process goes on more easily than in the converter, and the removal of phosphorus is likewise more complete. Metallurgists have then at the present time two different processes of forming steel, either in the converter or in the furnace: in the one pure kinds of cast iron are treated in the apparatus with acid lining, in the other impure products are subjected to basic linings. The question then arises, if, under otherwise equal conditions, a complete refining follows as well with a basic lining as with an acid, why should not the basic lining be simply employed, so that the steel of greater purity furnished by that method be obtained?

To this it may be replied that when the furnace is used, it would in many cases be advisable to replace the acid lining with a basic one, whereby, in fact, the work would offer no obstacle. It is quite otherwise where the converter is employed. Here the cast iron cannot be worked with a basic lining so advantageously as when the acid lining is employed. It is rich in silicium, which introduces great difficulties when the basic lining is employed. If, however, it be possible so to regulate the smelting furnace that the iron contains less silicium, the intermolecular combustion may be so regulated that no sufficient heat shall be developed to maintain the metal and slag in a liquid state. Thus it is that the preparation of pure cast iron in basic converters presents difficulties. A mixed process may, it is true, be employed; the scorification, first in an acid converter, and then a further refining in a basic converter; only this process would be costly and complicated. The future will decide what is best to be done in this respect. The white raw iron employed at Creusot in the basic process has the average composition: 3=C; 1·30=Si; 1·50–2·0=Mn; 2·50–300 P; and 0·20 S, while the basic (1) and acid (2) steel contain:

	1.	2.
Carbon	0·43	0·40
Silicium	trace.	0·30
Manganese	0·76	0·66
Phosphorus	0·06	0·075
Sulphur	0·029	0·04

The basic lining, consisting of dolomite treated with tar, has the composition: CaO=53; MgO=35·8; and SiO_2=7·7; while the slags at the end of the decarburation (1) and dephosphorization (2) have the following constitution:

	1.	2.
Silicic acid	22	12
Lime and magnesia	47	54
Iron and manganese oxides	11	11
Phosphoric acid	12	16
Alumina and chromium sulphates	5	5

A Marine Engineer's Prophecies.

Mr. James R. Thomsen, one of the builders of the steamship Servia, at the launch of the Aurania, another large first-class steamer for the Cunard Company, lately made the statement, prophetically, that the coming Atlantic steamship would be propelled by twin screws at twenty knots average speed, and would carry no cargo, her profit lying in the fact that she would make fifty per cent more trips. She would carry neither masts nor sails, her twin machinery reducing the probabilities of accidents, and, of course, increasing her safety, while obviating the necessity of the old-time auxiliary—sail power. There were fifty large steamships built on the Clyde last year, and about one-half of that number were fitted with corrugated steel furnaces, which are said to effect a saving of from ten to fourteen per cent.