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**Contents.**

(Illustrated articles are marked with an asterisk.)



TABLE OF CONTENTS OF

**THE SCIENTIFIC AMERICAN SUPPLEMENT**

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## MEETING OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

However skillful the mechanician, he may reasonably hope to gain something by a comparison of work with his fellows. The one may have found a simple means of performing what before was a difficult operation, and the other hit upon a plan reducing the cost of operation. Let them come together and exchange ideas, and it is readily seen that both will be benefited. This comparison of work is of the most importance where new processes are in course of development. Seeing this, the electric lighting fraternity have at last bestirred themselves, and formed an organization for mutual advantage and instruction. This organization, called the National Electric Light Association, met last week at the Union Square Hotel, New York city, and the three days' sitting of the convention brought out much that is interesting to the general public and a great deal that is of importance to those engaged in operating electric lighting plants. The most important papers and addresses were upon the advantages of electricity as an illuminant, proper construction and arrangement of engines and boilers, incandescent lighting, past and present, tower system of electric lighting, and underground wires.

The value and necessity of comparison of processes was clearly illustrated at many points in the discussions. Allowing for the difference in price of coal in one section of the country and another, some were found to be paying twice, and in one case—a plant in Iowa—nearly four times as much for the maintenance of 2,000 candle power arc lights as others. This disparity in cost was shown to come from the use of engines not fitted for the work, or from bad arrangement of grates and boilers. It was shown that shafting is a great waste of power in an electric light machine, and the use of countershafting a positive waste of money. Those plants give the best satisfaction, and are most economical, in which the engines and dynamos are coupled up directly. A curious fact was brought out during the meeting concerning the effect of the introduction of electric lighting upon the business of the gas companies. It would naturally be supposed that, when the electric light came to be generally used in the streets and offices of a town, there would be a relative diminution in the demand for gas. Yet the contrary, it seems, is the case. It was testified to in the convention, and confirmed on all sides, that wherever the electric light was introduced the gas companies greatly increased their business. This phenomenon is thus accounted for: The public get accustomed to more light, and therefore use more gas burners. Stores and show windows where gas is used look dim and dingy near others lighted with electricity, by reason of the contrast, and this appearance can only be rectified by turning on more burners.

In the paper on tower lighting, the author scarcely maintained his point that it was more efficient than pole lighting for the illumination of cities, though it seems to have some advantages, notably that of being less trying to the eyes. He cited the case of the lighting of Detroit, Mich., by a system of iron towers and masts, similar to those in use in Union and Madison Squares in New York city. The area to be lighted is 10½ square miles. The system comprised 90 skeleton iron towers, being for the most part 150 feet in height. In the thickly populated districts these towers are placed in the form of triangles, something less than a fifth of a mile apart, while in the outskirts of the city they are half a mile apart. There are nearly four hundred 2,000 candle power voltaic arc lights in all, and so thoroughly was the city illuminated by these last year, and so satisfactorily, that the citizens, so the author said, demanded the renewal of the electric light company's contract for the coming year.

The cost to the city of Detroit is, it seems, more than double what it was with gas, but the electric light people insist that the city is furnished with more than twice as much light as formerly; and whether this is so or not, the city inferentially shows its appreciation of electric lighting by its renewal of the contract, though there is reason to believe that even more satisfaction would be given by the use of the ordinary pole lighting, such as is in use in Broadway, Fifth Avenue, and other New York streets.

The paper on underground wires, though the last to be read, is perhaps of the most interest to the general public, owing to the present controversy and complication. The author began with something like a eulogy of a certain telegraph company, which has not particularly attracted attention for broadness of policy or for commendable practices. This company, according to the author, began burying its wires ten years ago, but recently it has been discovered that the gutta percha insulation of its line has been destroyed by the effects of the steam heating pipes, and it has been abandoned. The system used was that in vogue in England—the simple drawing of gutta percha cables through ordidary gas pipe.

In the opinion of the author, and he has had an extensive practical experience in such matters, the sinking of the arc-light wires is an exceedingly difficult problem, which will require much thought and many dollars to solve. He said: "So far as the arc-light companies are concerned, the present movement is well timed, as reconstruction would have to be begun in any event. The present lines are not of a permanent character, and the insulation is not in the best condition. I believe that the subway commission will prepare a plan for the accommodation of all services, and that when it is carried out, all companies can by lease or purchase obtain perpetual rights in such subways. No system will be approved that is not sufficiently comprehensive to meet the demands of all classes of service." But later on in the paper the problem of burying the arc-light wires appeared not to be so difficult after all, for the author described a system of underground conduits now in use in Chicago, in which these arc wires work well along with telephone and telegraph wires. This conduit, he said, is made of concrete, the result of mixing asphaltum and silex, and is moulded and at the same time hammered into lengths of about three and a half feet, through which are formed at the same time longitudinal ducts, the whole looking not unlike a tubular boiler. One end is provided with a flange to allow for the secure joining of the section; being cemented with the same material of which they are made—applied hot. Manholes are arranged at the intersections of the streets for renewing and repairing.

Perhaps this Chicago line, though entirely successful thus far, should be regarded as a makeshift, rather than as a permanent construction. For it is not yet known, as the author inferentially admitted, whether or no it would withstand the test of time as well as it withstood the government test of 5,500 pounds crushing strain per inch.

## CAR SEATS.

That an entirely new departure in car seat construction is needed is apparent to any one who has studied the American car. One difficulty to be met and overcome is the insufficient width of the American car body. Bodies from twelve to eighteen inches wider than those now in use may safely be carried on trucks of the standard gauge, even at high rates of speed. This has been done for years on the Erie road, without accident. A wider car would, however, call for radical alterations in stations, platforms, bridges, tunnels, signal towers, and even in the tracks of some roads.

Such alterations and improvements cannot be looked for at present. More room in the seats can be obtained by sacrificing one seat in the width of the car; the space thus gained being given to the aisle and the three remaining seats. Many faults of car seats may be corrected without structural changes in the cars themselves. One glaring fault is the insufficient width of the seat, from front to back, which does not properly support a full-grown person. The cushion is of improper shape, being highest in the middle; a form made necessary by the reversible back, although its convex form is much better than those in which an attempt has been made to fit the person. The back is too low to comfortably support the head and shoulders, yet it projects from seven to eight inches below the level of the seat, and is so much too wide. This wastes a large quantity of expensive covering material. Most backs do not give support at the proper place, and are convex on the corners, where concavity is needed. They should be convex both horizontally and vertically. The seat, from seventeen to eighteen inches high at the front edge, is about right for a six-foot man, yet the foot rest is too far away to be of use even to a tall person, and is beyond the reach of others. With a practicable rest the present height would be proper. The seat frame, while bulky and heavy, is not strong, and is placed so low that there is no room beneath the seat. By simple modifications of the frame, this space could be utilized and made available for satchels, etc.

Another evil belonging to the reversible back is the necessity for making the seat parallel with the floor. A tilting seat, which tips the frame one-half or three-quarters of an inch, has in a few cases been adopted. It costs much, and the advantage is not appreciable. The inner end of the seat is well covered with catches, mouldings, and bars which search out tender portions of the anatomy. The sharp moulding is architecturally correct on the window rail, because as a cornice it crowns a wall. This may satisfy the architects, but common passengers would rather violate architectural proprieties, and have round corners well cushioned.

Alterations are needed in the aisle end of the seats. The fashionable wood end is less comfortable than the old style of iron, and is inconvenient because it is open. The arm rests are hard, and the "nickel plated horse rasps" of some roads are a public nuisance. A plush surface is by far the most satisfactory.

The following average dimensions of passenger cars and seats will give the inventor some idea of the problem before him: The inside width varies from 9 feet 2 inches to 8 feet 5 inches above the truss plank, below, or within 11 or 12 inches of the floor; the car is usually from 2½ to 4 inches narrower. Seats are spaced from 26 to 36 inches between centers, and have from 11 to 18 inches in the clear at the level of the seat. The latter is a liberal figure. The back is from 36 to 37 inches

long, which leaves an aisle of about 24 inches, according to the width of the body of the car. The seat cushion is longer than the back to the extent of an inch or two. The cushion is from 17 to 20 inches wide, and stands from 17 to 19½ inches high. The backs come from 16 to 18 inches above the cushions, and are from 25 to 30 inches wide from top to bottom. The waste of covering material on some of the wider backs, on account of their projection below the cushions, amounts to as much as half a square yard. This may be averaged at from 12 to 15 yards per car. Seat arms are from 25 to 27½ or 28 inches from the floor.

The following are some of the points of a comfortable seat: It must be convex wherever it touches the person, as hollow curves are tiresome. The back should be convex, both horizontally and vertically, except where straight lines are used. The seat should be inclined, and there should be a good foot rest.

Parlor car chairs are even more objectionable. Nominally revolving, they interfere with each other, and are less comfortable than if fixed. They have most of the faults of the day coach seats. The promising field for the inventor is in the seat of the day coach, and certainly he who devises and introduces a seat meeting the requirements of the case ought to be well rewarded financially.

## ASPECTS OF THE PLANETS FOR SEPTEMBER.

### MERCURY

is morning star on and after the 2d. He wins the place of honor on the September record, for, though the most insignificant member of the sun's family, he is the most active of the brotherhood during the month.

On the 2d, at 1 o'clock in the afternoon, he is in inferior conjunction with the sun, passing between the earth's sun, as the moon does at new moon, and changing his role from evening to morning star. He is then on the western side of the sun, and, traveling at his most rapid pace, arrives on the 15th, at noonday, at his western elongation, the extreme limit of the invisible chain that binds him to the sun. He is 17° 52′ west of the sun, and at that time and for a week before and after may be picked up by keen-eyed observers, though the conditions are unfavorable. It is the last time during the year when he will be visible as morning star.

On the 15th Mercury rises nearly an hour and a half before the sun. He must be looked for about 7° north of the sunrise point, and about 7° south of Regulus. On the 27th, at 4 o'clock in the morning, Mercury is in conjunction with Jupiter, being 52′ north. This is the only planetary conjunction of the month. Both planets are moving westward, but Mercury overtakes and passes Jupiter on the way. The planets, near the time of conjunction, may be seen with the aid of an opera glass.

Mercury, on the 15th, is at his ascending node; on the 20th he is in perihelion; on the 30th he is at his greatest distance north of the sun's center.

The right ascension of Mercury on the 1st is 10 h. 46 m.; his declination is 3° 26′ north; his diameter is 10·4″; and he is in the constellation Leo.

Mercury sets on the 1st about 6 o'clock in the evening; on the 30th he rises at about a quarter before 5 o'clock.

### SATURN

is morning star, and wins the second place for being at present the most beautiful of the stars, as Jupiter is for a time hidden in the sunlight, and Venus lingers too near the greater light that rules the day to be seen long after his disappearance. This wonder of the system takes no active part in the events of the month, but he looks serenely beautiful as, looming above the eastern horizon about midnight on the first part of the month, he slowly makes his way to the zenith, the leader of the surrounding myriad stars, reaching his culminating point just as he and his twinkling companions disappear in the light of the coming day.

The right ascension of Saturn on the 1st is 6 h. 27 m.; his declination is 22° 24′ north; his diameter is 16·6″; and he is in the constellation Gemini.

Saturn rises on the 1st at midnight; on the 30th he rises about a quarter after 10 o'clock in the evening.

### VENUS

is evening star, and reigns supreme in the western sky, being the only visible planet after the sun goes down. She is still moving southward with rapid steps, thus decreasing the time of her stay above the horizon, and keeping her at about the same apparent distance from the sun throughout the month, though the distance between sun and star is constantly increasing as Venus proceeds on her eastward course. Southern observers will have delightful views of the fair evening star during September, and northern observers will have their turn for admiring the fascinating planet when, after pursuing her swift course to her extreme southern limit, she turns her steps northward, and adorns the northwest instead of the southwest portion of the sky. Venus sets during the month about an hour after the sun, but is now so bright on account of her nearer approach to the earth that her increase in size and brilliancy is plainly perceptible.

The fair evening star is in conjunction with Spica, or Alpha Virginis, early on the morning of the 10th, Venus being 2° 20′ north. Planet and star will be near together on the evening of the 9th, but a powerful glass will be required to obtain a glimpse of the star.

The right ascension of Venus on the 1st is 12 h. 42 m.; her declination is 3° 55′ south; her diameter is 12·6″; and she is in the constellation Virgo.

Venus sets on the 1st about half past 7 o'clock in the evening; on the 30th she sets about a quarter before 7 o'clock.

### URANUS

is evening star until the 26th, and then morning star. On the 26th, at 2 o'clock in the morning, Uranus is in conjunction with the sun, passing beyond him and reappearing on his western side. Uranus is the last of the giant planets to reach conjunction, and after he passes the goal the giants of the system are all on the western side of the sun.

The right ascension of Uranus on the 1st is 12 h. 7 m.; his declination is 0° 4′ south; his diameter is 3·4″; and he is in the constellation Virgo.

Uranus sets on the 1st soon after 7 o'clock in the evening; on the 30th he rises about a quarter after 5 o'clock in the morning.

### NEPTUNE

is morning star, and pursues his far-away course without encountering any other planet or large star, wandering just now in a region that is all his own. He is approaching his nearest point to the earth, and if he could change places with Mars, would create a great excitement in our sky.

The right ascension of Neptune on the 1st is 3 h. 34 m.; his declination is 17° 28′ north; his diameter is 2·6″; and he is in the constellation Taurus.

Neptune rises on the 1st at half past 9 o'clock in the evening; on the 30th he rises at half past 7 o'clock.

### MARS

is morning star. He is now large enough to be visible, and his course may be easily traced by those who are sufficiently interested to rise for the purpose in the small hours of the morning. On the 1st he is seen in the constellation Gemini; on the 12th he is in line with Castor and Pollux; on the 24th he may be found in the cluster of stars in Cancer known as Praesepe.

The right ascension of Mars on the 1st is 7 h. 28 m.; his declination is 22° 39′ north; his diameter is 5″; and he may be found in the constellation Gemini.

Mars rises on the 1st about 1 o'clock in the morning; on the 30th he rises about half past 12 o'clock.

### JUPITER

is evening star until the 8th, and then changes his role to that of morning star. On the 8th, at 5 o'clock in the afternoon, this brilliant planet is in conjunction with the sun, disappearing behind him, and being for a time totally lost to terrestrial view. He will, however, soon take his place among the visible morning stars, and afford new material for telescopic research. The latest observations point to a revival of the famous red spot, and seem to establish it as a permanent feature on the planet's surface. If so, telescopists will have a tangible point to build their theories upon, a wedge to effect an entrance beneath the cloud-atmosphere that envelops the pride of the system.

The right ascension of Jupiter on the 1st is 11 h. 25 m.; his declination is 6° 56′ north; his diameter is 29·2″; and he is in the constellation Virgo.

Jupiter sets on the 1st at half past 6 o'clock in the evening; on the 30th he rises at a quarter after 4 o'clock in the morning.

### THE MOON.

The September moon fulls on the 24th, at 54 minutes after 2 o'clock in the morning. On the 3d, the day after the last quarter, at 9 h. 27 m. P.M., the moon is in conjunction with Saturn, being 4° 17′ south. On the 5th, at 1 h. 28 m. A.M., she is at her nearest point to Mars, being 5° 33′ south. On the 7th, at 10 h. 12 m. P.M., she is in close conjunction with Mercury, being 0° 37′ north. On the 8th, at 4 h. 55 m. P.M., the new moon when about an hour old is in conjuction with Jupiter, being 1° 57′ south. This event occurs a few minutes before the planet's conjunction with the sun. On the 9th, at 6 h. 34 m. P.M., the moon is in very close conjunction with Uranus, being 4′ south. On the 11th, at 5 h. 28 m. A.M., she is in conjuction with Venus, be- 2° 27′ north. On the 28th, at 3 h. 7 m. A.M., she is in conjunction with Neptune, being 2° 51′ south.

### OCCULTATION OF ALDEBARAN.

An occultation of Aldebaran, or Alpha Tauri, occurs on the 29th that will be visible in Washington and its vicinity. We give the Washington mean time for the occurrence, which will vary in other places on account of the moon's parallax, or difference in her direction as seen from two different points. The immersion will take place at 1 h. 30 m. A.M., when the bright limb of the waning moon will suddenly hide from view the red star Aldebaran. The occultation will continue 1 h. 20 m., when the star will seem to spring into being from the dark side of the moon, the emersion taking place at 2 h. 50 m. A.M. Early risers will be rewarded for the effort, for this is all that is required to be present at the exhibition. The moon occults numerous small stars during the month, but the opportunity for beholding the occultation of a first magnitude star is rare. We assure observers that the heavens present a charming picture at half past 1 o'clock in the morning.

The moon also occults Aldebaran on the 9th, for those who see the moon in the same position as that from which she is seen at the center of the earth. She does more than to occult a star, for on the 7th she occults the planet Mercury. But observers in this vicinity are neither favored by position nor time to behold the spectacle when the slender crescent of the waning moon hides from view the smallest of the brotherhood.

### TOTAL ECLIPSE OF THE SUN.

A total eclipse of the sun occurs on the 8th, though not a hair's breadth of his shining face is obscured to our view. The favored few who will behold the grandest phenomenon witnessed by mortal eye must be under the moon's dark shadow in the South Pacific Ocean. The path of totality commences near the eastern shore of Australia, passes over New Zealand, and ends near the South pole. It takes in its way Cook's Straits, which separate the two islands constituting New Zealand. The shores of the islands bordering on the straits seem to be the sole locality for observing the eclipse on land, the remainder of the path passing over a waste of water. A more ineligible locality could scarcely be chosen for the occurrence of the magnificent spectacle. But the moon's shadow is regulated by inexorable law, and those who wish to see the sun's face hidden for two precious minutes must go to New Zealand or sail on the Southern Pacific Ocean. An observing party from Melbourne plan to be present on the grand occasion, taking advantage of the comparative nearness to the scene of action.

### ECLIPSE OF THE MOON.

A partial eclipse of the moon takes place on the 24th, visible on the Atlantic Ocean, in North and Sou h America, and on the Pacific Ocean. The eclipse will be easily observed in this region. It begins at 1 h. 15 m. A.M. The middle of the eclipse is reached at 2 h. 48 m. A.M. The eclipse ends at 4 h. 22 m. A.M. The magnitude of the eclipse is 0·79, the moon's diameter being 1.

### SEPTEMBER

bears witness to an active and stirring season among the members of the solar family, wherein the sun himself plays a prominent part. Two great planets, Jupiter and Uranus, as they reach conjunction disappear from the sun's eastern side to reappear on his western. Mercury flits between the earth and sun at inferior conjunction, and oscillates to his extreme western limit or elongation, where early risers may behold him for a short time before his fitful light is quenched in the sunbeams. The sun reaches the vernal equinox, and equal day and night mark the passing hours, while he shines benignly over the earth from pole to pole. A favored few will behold a total eclipse of the sun's radiant face, and be filled with wonder and delight as the silvery corona starts into view and the rosy flames dart forth, while the stars appear in the darkened sky, and the face of nature is shrouded in funereal gloom. The moon is not behind the superior members of the family in the part she plays in the incidents of the month. She treats us to a partial eclipse and the occultation of a bright star. More than this, our fair satellite crowns the month with the harvest moon, when for several successive evenings the lesser orb rises in the eastern sky as soon as the sun disappears in the western, thus prolonging the day, flooding the earth with silvery light, and making it beautiful as a dream of the land where there is no night. There may be other planets combining more elements of natural beauty than this little world, when the sunset clouds linger in the west, and the harvest moon, rising majestically in the east, looks serenely down upon a belt of earthly domain ripe for the harvest. If such fairy abodes exist in the great universe of space, we have no desire to visit them unless we can be equipped for the voyage with higher powers than we now possess for the appreciation of the transcendent scene.

## A New Wood Filler.

In order to avoid the necessity of using wood fillers of different composition for light and dark woods respectively, Mr. Henry Hales, of Ridgewood, N. J., has recently patented a composition of a transparent nature for use on all woods indifferently. It comprises finely powdered soapstone or talc, finely powdered glass, and a suitable liquid vehicle of oil or varnish, the soapstone enabling the operator to obtain a better polish than could be obtained with the glass alone. The patent points out the proportions and manner of mixing and applying the composition, which is intended to impart only sufficient color on light woods to fully develop the grain, while sufficiently transparent to leave no perceptible mark of its presence on dark woods.

## A Big Blast.

A mass of granite estimated to weigh at least 500,000 tons was displaced recently on the line of the Iron Mountain Railroad, Missouri, by a single blast. A shaft 65 feet deep was sunk, with lateral chambers, in which 5 tons of powder were stored. After the shaft had been nearly filled to the top, an electric spark from a battery a half a mile distant fired the magazine with the result indicated.