

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included, \$3 20
One copy, six months, postage included, 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies, 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 19, 1885.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Aluminum smelting by electricity, Ammonia synthesis, Arc light, Value of, etc., with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 507,

For the Week Ending September 19, 1885.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement by page number, including sections like I. ENGINEERING AND MECHANICS, II. TECHNOLOGY, III. ART AND ARCHITECTURE, etc.

CYLINDRICAL NUTS.

The substitution of cylindrical nuts for those of a square or a hexagonal form has been advocated, with very good reasons as a backing. Recently an opportunity was given to see a practical illustration. A machinist had an order for a small ornamental steam engine, to be placed in the show window of a coffee and spice establishment, and on it he used cylindrical nuts instead of hexagonal ones.

The method of making the nuts produced them in a very rapid manner. A bar of steel, of the proper diameter to finish to size after being turned, was fed through the head of a turret lathe, the end squared, a hole drilled in it, the tap run in, the surface turned, and the nut cut off; all done by fixed tools in the turret and the cross cutting-off tool.

In addition to these advantages of quick work, almost self-acting, the rapid production of the nuts and their finish from the first inception, there is the advantage of the requirement of less metal for the requisite strength.

Another advantage that the cylindrical nut has over the angular nut is that the wrench may get a grip in moving through the smallest arc of a circle; an advantage that will be understood by the setters-up of machinery under difficulties.

RAILWAY IMPROVEMENTS NEEDED.

The recent disaster near St. Catherines, Ontario, where a heavy passenger train drawn by two locomotives went through a swing bridge into the canal, brings to mind the fact that a similar accident occurred at the same place eleven years ago, and that about 1854 one of the most serious disasters on record occurred under similar circumstances near there on the same road at a canal bridge that has since been removed or abandoned.

There are appliances that will, if kept in working order, effectually prevent such accidents. It is true that accidents do happen occasionally on roads that are equipped with the most approved means of safety, but this is chargeable to the neglect of those who have the care of the appliances, rather than to any inherent defect.

brakes to operate. This is the fifth train that has met destruction on this side of the Atlantic within two years from failure of air brakes, and accidents less serious are frequent from the same cause.

Air brakes are usually placed under the care of skillful mechanics, whose business is to give them thorough inspection and all needed repairs at the end and before the commencement of each trip, but notwithstanding these precautions they sometimes refuse to act, and the results are usually serious.

AS TO THE SINKING OF THE WIRES.

The time given to the electrical companies in New York city to present plans and come to an agreement as to the system to be adopted in burying the wires has now gone by, and, according to the law passed by the last legislature, they must accept the plan chosen by the Electrical Subway Commission, or have their wires buried by it vi et armis.

Unhappily for the New York companies, the commission contains neither an electrician nor a scientific expert, and however good their judgment may be, it is scarcely probable that they will be able to discover a means of efficiently working long lines of telephone, at least, underground, when a score of experts employed by the companies have failed in a similar search.

It is pretty evident, too, by recent action of some of the companies, that the constitutionality of the law is to be thoroughly tested before they succumb; the Commission in the mean time being enjoined from interference.

Having once had authority to string the wires through the streets, and there having been no proviso to restrain them at any moment from further operation of aerial lines, they cannot be constitutionally forced to change the mode of operation without compensation.

Another advantage that the cylindrical nut has over the angular nut is that the wrench may get a grip in moving through the smallest arc of a circle; an advantage that will be understood by the setters-up of machinery under difficulties.

How conclusive this reasoning may be, the writer has no intention of trying to determine. There is reason, however, to believe that the courts will be called upon to do so.

SHOP INDEPENDENCE.

Unless one has an "independent fortune," one making him independent of financial circumstances, there is no condition in civilized life preferable to that of a shop mechanic. Especially is this the fact if the mechanic is competent and feels an interest in his work.

There are others who do not. An illustration is recent. A fine workman, a machinist, possessing other valuable qualifications as an executive manager, a public speaker, and with great personal power of persuasion, was induced to take the superintendency and management of a Young Men's Christian Association.

Recently he was seen, and asked if the change from a public life to a shop life was agreeable. He was quite enthusiastic in his praise of shop life; he was independent; had no meddling suggestors to bother him; could scan his day's work in the morning, and see it done in the evening; was nobody's slave or servitor; did not have to modify his plans to suit a committee; his eight

or ten hours per day was his absolute limit of work; and all the remainder was absolutely and really his and his family's. This is the sort of mechanic that recommends shop life, and proves that it is one of the most independent that a sensible man can follow.

DEATH VALLEY.

The name is fearfully suggestive, and yet few places in the world deserve their appellations so well as does the Death Valley of California, nor is it easy to find any other locality in any country whatever which gathers about itself so much that inspires horror and dread. A region where a man can die of thirst while he has water within his reach, more than he can drink, may well bear the most terrible title that can be given it; and this name—Death Valley—given from the first known event in its history, thirty-five years ago, will doubtless cling to the spot to the end of time.

It is in the southeastern part of Inyo Co., Cal., and the point at which the meridian of 116° 45' W. crosses 36° 10' N. is as nearly as possible in its center of horrors. Probably only one other spot of which we have any knowledge, the Guevo Upas, or Vale of Poison, in Java, exceeds the fatality of Death Valley.

The valley itself is 40 miles by 8, running nearly north and south, and every portion of this is desert and barren in the extreme, as is in fact the entire surrounding country; but a narrow central space along the eastern side, about fifteen miles in length, embodies the typical features in their highest intensity. Into this, not *Porte d'enfer*, but *Puit d'enfer*, very few persons have ever gone, that is, who returned to tell the tale, and what is here related pertains to the higher and comparatively moderate parts toward the borders of the valley.

The dangers are the result of atmospheric conditions solely. Lack of water may be a fatal evil, but this can be avoided; supplies of water may be carried, or better still, it is now tolerably well ascertained that water is available by sinking even shallow wells in much the greater extent of the upper portions of the valley.

But the water fails to afford its usual life-giving value from two causes. The first of these is the heat. Of course this is moderated during two or three of the winter months, and for that space of time a residence on the borders of Death Valley is possible without any exceeding great risk. But this soon passes away, and the furnace is in blast. By about April the average (of day and night) is from 90° to 95°; by May it is 95° to 100°; and a little later it averages over 100°, reaching often 120° to 125° in the coolest place that can be found. If this was with a damp atmosphere it would stifle any human life with great rapidity, but a certain amount of dryness enables it to be borne with more safety. Here, however, comes in the second of the two evils which have been indicated: the intense dryness of the atmosphere. This is so excessive as to be in many instances fatal, in spite of every precaution. The writer has never tested the full severity of this feature in Death Valley itself, but his experience along its immediate border renders him ready to give full credence to the statement that many cases of death have occurred "when water was plenty, but could not be drunk fast enough to supply the drain caused by the desiccative power of the dry, hot air." In fact, in one instance he himself nearly reached that condition, and a few hours longer of the heat and dryness would have placed his own name among those of its victims.

It has been said that birds drop dead in attempting to cross the valley. Mr. Hawkins, who visited it in 1882, says that he "picked up, at different times, two little birds, a mile or so from water, whose bodies were still warm, having evidently but just dropped dead." The bodies of men and their horses are liable to be encountered at any time; they have been found within a mile of water, and in one case with water still in their canteens, and a supply of food as well, showing that the climate was the cause of death. With these facts in view, it is not unreasonable to say that the name Death Valley is well bestowed. And if this is the state of things on the elevated borders, ranging from 1,200 to 2,000 feet and more above the sea, what must be the heat and the dryness in the very focus? For one of the additional wonders of Death Valley is that its central region lies away below the level of the sea. There is perhaps no other spot on the globe which at so great a distance from the ocean reaches such a depression—159 feet. The Dead Sea, with the gorges of the Jordan and the Arabah, of course greatly exceeds this, but it is not widely separated from the eastern parallel border of the Mediterranean.

The climatic violence of this deep trough of Death Valley must be left to conjecture. It is certain that no man could survive there long enough to secure continuous observations of any extent.

An Association for the Protection of Plants has been started at Geneva. The object is to preserve Alpine rarities from the extermination with which the annually increasing number of botanists, mercenary collectors, and mountaineering tourists generally is said to menace them.

The Great Yacht Race.

The international contest between the fastest pleasure sailing craft of Great Britain and the United States, which was to have been completed during the week commencing September 7, was interrupted by a most unlucky accident, necessitating delay. The conditions of the race made it necessary that the yachts should go over the course of forty miles in seven hours, and on the first appointed day there was not sufficient wind for this purpose. The Puritan and the Genesta made the trial, but did not either of them reach the stake-boat, the wind being so light that it seemed rather a drifting than a sailing match. The next day, September 8, was then appointed for the first race. On this occasion the wind was good enough to promise a spirited contest, but, in taking position to cross the starting line, the Puritan crossed the course of the Genesta, with the result of disabling both yachts, the former's mainsail being torn and the latter losing her jib-boom. The judges decided it the fault of the Puritan, and, ruling her out, offered the Genesta the privilege of going over the course. This her owner declined, saying they had come over for a race and not for a "walkover," the occurrence having been undoubtedly entirely accidental, though indicating extreme sharp work by the sailing masters.

To give time for necessary repairs, the first race was set down for Friday, Sept. 11, the second one for Sept. 14, and the third, if it should be necessary, to take place on Sept. 16. The Genesta's owners found no difficulty in getting quickly fitted out in New York yards with a new jib of Georgia pine, while the Puritan's sails were as quickly mended, to make both yachts ready for the race on the 11th inst., which, like the first day's attempt, was a failure, the wind being too light for the yachts to go over the course in the required time of seven hours, although both crews exhibited fine seamanship for several hours in their attempts to get ahead of each other.

The "sailing measurement" of the two yachts, as made out by the official measurer of the New York Yacht Club, was as follows: Genesta, perpendicular, from topmast head to deck, 97.2 feet; base, from end of boom to tip of bowsprit, 140.5 feet; gaff, 46 feet; water line, 81.6 feet. Puritan: perpendicular, 102.01 feet; base, 144.6 feet; gaff, 47 feet; water line, 81.1 feet. This measurement made the sailing length of the Genesta 83.05 feet, and that of the Puritan 83.85 feet, so that the latter had to give the Genesta a time allowance in the race of 31 seconds.

History of the Tomato.

In an article upon "Kitchen Garden Esculents of American Origin," in the *American Naturalist*, Dr. E. L. Sturtevant has some interesting remarks upon the tomato, from which we make the following extracts:

"Tomatoes were eaten by the Nahua tribes, and were called (singly) *tomatl* (plural *tomame*)." The tomato "was described by various European botanists of the sixteenth century." . . . It seems to have been grown in European gardens as a fruit, from its first introduction, judging from the references in Dodonæus and Gerard; but Parkinson, 1656, speaks of it as grown in England for ornament and curiosity only. In Italy, Chateauvieux, 1812, mentions its cultivation on a large scale for the Naples and Rome market. It is probable that its use was at first more general among southern nations, as we find that the Anglo-Saxon race was the last to receive it into the kitchen garden. Thus, in 1774, Long describes the fruit well, and mentions its frequent use in soups and sauces, and adds that it is likewise fried and served up with eggs. In 1778 Marre and Abercrombie mention five varieties as known, two of which are described as scentless and burnt-leaved, and add that they are eaten by the Spaniards and Portuguese in particular, and are in high esteem.

"In the United States its introduction preceded by many years its use as we at present know it. It is said to have reached Philadelphia from St. Domingo in 1798, but not to have been sold in the markets until 1829. It was used as an article of food in New Orleans in 1812. The first notice of it in American gardens was apparently by Jefferson, who notes it in Virginia gardens in 1781. It was introduced into Salem, Mass., about 1802, by an Italian, but he found it difficult to persuade people even to taste the fruit. Among American writers on gardening, McMahon, 1806, mentions the tomato, but no varieties, as 'in much esteem for culinary purposes;' Gardiner and Hepburn, 1818, say, 'Make excellent pickles;' Fessenden, 1828, quotes from Loudon only; Bridgeman, 1832, says, 'Much cultivated for its fruits in soups and sauces.' They were first grown in western New York in 1825, the seed from Virginia, and in 1830 were not produced by the vegetable gardeners about Albany; yet directions for cultivating this fruit appeared in Thorburn's Gardeners' Calendar, 2d edit., New York, 1817. Buist writes that as an esculent plant in 1828-29 the tomato was almost detested, yet in ten years more every variety of pill and panacea was 'extract of tomato.' Mr. T. S. Gold, Secretary of the Connecticut Board of Agriculture, writes me that 'we raised our first tomatoes

about 1832, only as a curiosity, made no use of them, though we had heard that the French ate them. They were called love apples.' D. J. Brown, 1834, describes six varieties, and says: 'The tomato until within the last twenty years was almost wholly unknown in this country as an esculent vegetable.' In 1835 they were sold by the dozen in Quincy Market, Boston. In the *Maine Farmer*, October 16, 1835, in an editorial on tomatoes, they are said to be cultivated in gardens in Maine, and to be 'a useful article of diet, and should be found on every man's table.' In a local lecture in one of the Western colleges about this time, a Dr. Bennett refers to the tomato or Jerusalem apple as being found in the markets in great abundance, and in the *New York Farmer* of this period one person is mentioned as having planted a large quantity for the purpose of making sauce. In 1844 the tomato was now acquiring that popularity which makes it so indispensable at present, writes R. Manning." From this it appears that "the esculent use of the tomato in America does not antedate the present century, and only became general about 1835 to 1840."

No Right to Steal Away Your Employer's Business.

In *Van Wyck vs. Horowitz*, New York Supreme Court, special term, 28 Daily Reg., 305, the question as to the right of a party to use another name upon his business cards, etc., by saying "late with," etc., is discussed. In this case the defendant, who had been employed by plaintiff as a workman upon jewelry and in the repair of watches, set up in a business similar to that kept by plaintiff, and put upon his cards and upon a sign in his store "Late with James P. Van Wyck." This use of his name the plaintiff sought to restrain, and the court granted a motion to continue an injunction, saying: The statement of the case evokes instant condemnation from the hearer, and an analysis of the thoughts which produce such instantaneous conclusions will show that it rests upon sound legal principles as well as upon the conscience of the hearer.

The defendant has no right of property in the name nor in the reputation of that business which he seeks to use with his own name and business so as to give his own prominence at the expense of the other. If the defendant had been a stove blackener, or hostler, or an errand boy in the employ of the plaintiff, or a clerk discharged for want of fidelity or competency, he could with just as much truth advertise himself as "late with James P. Van Wyck." The extreme supposed cases are put to illustrate the danger of the counsel's position. It cannot be that a man who has sustained any position toward or had any employment for a well known individual, that thereby he obtains the right to use that name in connection with his own, so as to advertise himself and his business at the expense of his former patron and employer, and to do it in a manner which is likely to, and often must, deceive as to the nature of the relations to him.

The motion to continue the injunction must be granted, because—

First. The defendant is, without authority, using the plaintiff's name, which is the use of another's property for his own benefit and to the injury of its owner.

Second. He is attempting to transfer to himself a part of the reputation of the store and business of the plaintiff, which also belong to the plaintiff as really and as truly as his name or his personal property of which he is the actual owner.

Third. The mode and manner of the use by the defendant of the name of the plaintiff are such as oftentimes to deceive, and because liable to deceive, and thus benefit the defendant at the expense of the plaintiff, such use must be held to be unlawful.

Value of the Arc Light.

Says the *Journal of Gas Lighting*: Sir James Douglass and many other disinterested observers of the course of events have for some time recalled electricians to a sense of the blunder they commit in devoting so much attention to the incandescent lamp and neglecting the arc light. It is notorious that the end and aim of incandescent lighting was simply to supersede gas. The extent to which this result is likely to be achieved is now pretty well understood. Electricians themselves are willing to admit that they cannot compete by means of incandescent lamps with gas at its present cost. The arc light, on the other hand, is susceptible of application for many purposes at a marked economy as compared with gas; and it is undoubtedly suitable for use in many places where gas cannot be obtained.

The older arc lamps brought themselves into disfavor by their unsteadiness; but this has, to a great extent, been remedied by improvements in the carbons, and by not expecting too much light from the power available. Arc lamps are still rather more liable to sudden extinctions than are incandescent lamps; and this failing will always cause them to be distrusted for street lighting and the illumination of large buildings frequented by the general public. On the whole, however, the field for profitable arc lighting is wider and more promising than that remaining for incandescent lighting. For many purposes there is no comparison between the arc and any other kind of artificial light.