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## 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 oppor tunity 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 engine was a horizontal one, with steam chest on the top of the cylinder, and all the hold-down bolts were furnished with cylindrical nuts, through the tops of which protruded the flattened convex ends of the bolts, making a very neat finish. The bolts were three-eighths of an inch diameter and the nuts three-quarters of an inch diameter; to have made them hexagonal they would have been a trifle over seven-eighths of an inch from corner to corner, and if square they would have been a full inch across corners, and neither the hexagonal nor the square nut would be any stronger than the cylindrical nut-the protruding corners give no additional strength. For a wrench he took a tool with opening jaws operated like a pair of pliers. These jaws, while slightly cpen, were reamed to fit the diameter of the nut, so that when closed on the nut the jaws would embrace almost its entire circumference; the leverage of the handles made a very slight pressure necessary to set up the nuts. The wrench did not have a short biting jaw, like a pair of pipetongs, which dig into the pipeat each grip, but the inside of the jaws were perfectly smooth, and left no mark on the nut in using.
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. The finished nut dropped, and the bar was advanced for another nut. dropped, and the bar was advanced for another nut.
There was no planing, milling, or seating on an arbor, as would be the case in forming and finishing rectangular nuts. Every machinist knows that lathe work is cheaper and quicker than reciprocating work, whether planer or milling machine.
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 vantage of the requirement of less metal for the
requisite strength. The embracing jaws of the wrench have a bearing on almost the entire circumference while on the square and hexagon nuts the bearing of the wrench is on only two opposite sides.
Another advantage that the cylindrical nut has over the angular nut is that the wrench may get a grip in moving through the smallest are of a circle; an advantage that will be understood by the setters-up of machinery under difficulties. With the square nut an entire quarter turn is required before, in a confined space, the wrench can get a new hold; and with the hexagonal nut not less than one-sixth of a revolution is necessary before the wrench can take a fresh grip When the wrench handle is long and the working plac is limited, these considerations are of consequence.

## RAILWAY IMPROVEMENTS NEEDED.

The recent disaster near St. Catherines. Ontario, where a heavy passenger train drawn by two locomo tives 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 recor 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. The liability of switch and draw bridge signals to become inoperative seems to be the
principal reason set forth by railway officials for refusing to adopt them, and this objection may be removed by a more simple construction, which would render them reliable and proof against derangement-
Simplifying their construction would also reduce the cost and remove the only remaining objection to thei general adoption. Most of the signal devices brought forward of late are expensive, and require much skill and constant watching. An automatic signal that is
not reliable at all times is more dangerous than those which are operated independently by an attendant. because greater reliance is placed upon the former, and it is not as closely watched by engineers. The had no warning of danger until he saw the ends of the rails at the pier, when he promptly moved the lever to apply the air brakes, but they failed to act. He then called for hand brakes, but it was too late. The primary cause of the accident was the lack of a proper mary cause of the acciaent was the lack of a proper
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. Doubtless the bridge would have been provided with an automatic signal were it not for an occasional failure of these appliances, and their excessive cost, and it would not seem a difficult matter to remove these objections. Air brakes are usually placed under the care of killful mechanics, whose business is to give them thor ough 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. Brakes and ignals that are more simple in construction, and require less skill and expense to keep in working order, are in demand.

## 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 viet 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 in terference. From reports which have reached us, the grounds on which an injunction will be asked may hus be summarized:
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 constituoperation of aerial lines, they cannot be constitu-
tionally forced to change the mode of operation without compensation. The right of the legislature to forbid any further stringing of wires, save what is required to keep the original lines in efficient working, is admitted. But to compel the companies to make the great outlay required in taking their wires down and placing them underground would be to mulct them in damages for doing what under their charters they have a clear right to do, and it was intended they should be protected in loing. The case of the elevated railroads might be cited as in many ways parallel. Having legislative authority to build the road the incorporators went to the expense of construction. They took a certain risk. Had the project proved a failure, they would have had to stand the loss-the State, of course, would not have compensated them. Now, the project having proved a success, can the legislature step in and regulate the rates at which they are to carry passengers? Eminent authority decided that it could not, and the Governor refused to sign the bill.
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 hop mechanic. Especially is this the fact if the mechanic is competent and feels an interest in his work. He has a comfortable shop, pleasant fellow workmen, good tools, and a job that will amount to something: when it is done; this is enough to content a man who has a pleasant home or a comfortable boarding place. And yet there are some who look upon shoplife as irksome and perfunctory.
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. He fille the position satisfactorily and creditably; but at last he tired and resigned. Strong influences were brought to induce him to change his determination. He refused, and for nearly two years has worked in the shop as a tool maker. He gets good pay, but refuses to be a boss-only an inspector-and works very day as any ordinary workman.
Recently he was seen, and asked if the change from a public life to a thop life was agreeable. He was quite enthusiastic in his praise of shop life; he was ind ependent; 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 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 known event in its history, thirty-five years
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 $116^{\circ} 45^{\prime} \mathrm{W}$. crosses the point at which the meridian of $116^{\circ} 45^{\prime} \mathrm{W}$. crosses
$36^{\circ} 10^{\prime} \mathrm{N}$. is as nearly as possible in its center of hor$36^{\circ} 10^{\prime} \mathbf{N}$. is as nearly as possible in its center of hor
rors. 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 sur rounding 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 valley.
of the ress are the result of atmospheric conditions solely. Lack of water may be a fatal evil, but this can be a voided; 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 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 $90^{\circ}$ to $95^{\circ}$; by May it is $95^{\circ}$ to $100^{\circ}$; and a little later it averages over $100^{\circ}$, reaching often $120^{\circ}$ to $125^{\circ}$ 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, mercenthe annually increasing number of botanists, mercen-
ary 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 stakeboat, 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 Genesta, with the result of disabling both yachts, the
former's mainsail being torn and the latter losing her 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 own 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 11 th 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, $144 \cdot 6$ feet; gafi, 47 feet; water line, $81 \cdot 1$ 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 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 AngloSaxon race was the last to receive it into the kitchen parlen. 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 burnet-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, men-
tions 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' Kalendar, 2d edit., New York, 1817. Buist writes that as an esculent plant in 1828-29 the tomato
was almost detested, yet in ton 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 frst 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. Browne, 1834, describes were called love apples.' D. J. Browne, 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 dis cussed. In this case the defendant, who had been em loyed 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 hiscardsand upon a sign in his store "Late with James P. Van Wyck." This useof hisname the plaintiff sought to restrain, and the court granted a motion to continue an injunction, saying: The statement of the case evokes instant consaying: The statement of the case evokes instant con-
demnation from the hearer, and an analysis of the demnation from the hearer, and an analysis of the 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 hor in the reputation of that business which he seeks o 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 dis charged for want of fidelity or competency, he could with just as much truth advertisehimself 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 ranted, because-
First. The defendant is, without authority, using he plaintiff's name, which is the useof 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 are Light.

Says the Journal of Gas Lighting: Sir James Dougass 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 are light, on the other hand, is susceptible f 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 failng 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.

