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STREET PAVEMENTS.

Columbus, Ohio, Jefferson, La., and New Orleans, as well as the common council of the city of New York, have joined in the rush for the Nicolson pavement. In the former city we are told that High street is to be Nicolsonized at an expense of $80,000. The city of Jefferson advertises a contract to pave one of its streets on this system, with another for wooden curbs to the sidewalks. In New Orleans and Chicago —two of the worst places in general for the endurance of wood on the ground—this pavement is commonly reputed to give entire satisfaction, and it is from experience in New Orleans that the action taken in the city of Jefferson has resulted.

The charms of the Nicolson pavement are almost overpowering to the judgment. Exemption from the deafening din which multiplies the labor of business between man and man, from the incessant jar which impairs the nervous system, from more than half the present cost of hauling goods and deterioration of horses and vehicles, and from the putrid accumulations in pavement crevices which turn to dust under the heat of the sun and destroy goods and clothing enough (to say nothing of health) to pay the whole cost of maintaining and daily sweeping a smooth pavement of the right sort: these are considerations which seem to decide men in favor of the economy of the Nicolson pavement, on less testimony from practice than they are willing in most cases to be satisfied with.

True, the reported testimony of experience in western cities, where this pavement has been longest tried, is, as we have before said, very strong. But there is another side to the question. We have before us a letter from a correspondent in Detroit, who presents it in this shape:—"I have examined the Nicolson pavement in Chicago, and have seen whole streets of it, that have been down five or six years at most, and are now completely used up by travel and rot." If this be true—and there are enough of our readers who know the facts which would verify or refute the statement—the mischief to public health from such vast masses of decaying vegetable matter could not be compensated by any advantage whatever.

It is possible that on well-drained sandy foundations, a wood pavement thoroughly packed in bituminous concrete may defy moisture and decay. But on the whole, the nature of wood and street soil together seem to be against the probability, and to indicate that in this respect at least, the Nicolson pavement is not perfect. It appears to us that the desideratum is to kyanize the wood by some process at once cheap enough to be practicable and efficient enough to insure it against decay. No doubt the owners of the Nicolson patent are alive to this necessity, but they may naturally be unwilling to burden their proposition with an additional cost that would probably defeat it altogether.

The problem is an interesting one to inventors. But let not their pains and ingenuity be thrown away in the dark. Few subjects, they should understand, have been so much studied and with so little success, as the paving of streets. No subject requires more practical knowledge and specific experience. It is of no use for people who know nothing of the paving business, however ingenious, to present their theoretical plans. We have before us a confident opinion that a perfect street would be made by plating the surface with iron. No wonder this correspondent complains that his suggestions are neglected. Iron pavement, far more ingeniously devised, was tried in this city years ago at great expense, with high hope and with ignominious failure. Iron sidewalks have also been tried by individual lot owners, and now exist as a nuisance to pedestrians, traversed even for a few feet with toil and peril. Stone has been tried in every shape, in every position and on every basis, and the deep, narrow-faced Belgian block, on a sand bed, remains the only thing tolerable in that line. All remember the renown of the great "Russ pavement" which was for some years the pride of Broadway, but after full experience has been cast to the moles and the bats as one of the worst pavements ever invented. One general law has been settled by all this costly and vexatious experience: *i. e.*, that it is impossible to know that a pavement is good for anything until it has been tried at least ten years on a New York city thoroughfare. This protracted test, the experience of Russ teaches that inventors of pavement must expect to abide, unless their contrivances are lucky enough to fail, as they mostly do, in a shorter period.

A MECHANICAL PARADOX.

Experiments have been going on for months in England, to determine the power of screw bolts to resist a sudden longitudinal strain. In repeated trials of projectiles against targets representing the armor plating of ships, it was found that the bolts which fastened the inner skin and outer plate, broke short off at a point just inside of the seat of the threads in the plate. Major Palliser conceived the idea of turning off the threads on the bolts between the points on the ends which engaged with the plates, thus reducing the diameter of the bolts. The result was almost incredible. It was found that a bolt with a thread cut its whole length became much stronger, or had practically more tensile strength, when the thread betwen the head and the engaging points was turned off, than when it was left on the bolt. Not only so: a smooth ⅞-inch bolt suspended by one end and subjected to the fall of a sliding weight striking the nut at its lower extremity, broke at the second blow, while a similar bolt turned down to ¾ of an inch except the screw end, bore ten blows and stretched ⅝ inch in 2¾ inches, before breaking.

The philosophy of this curious result becomes a very interesting question. The unqualified proposition that a bar of iron is stronger after losing a portion of its material, than before, is incredible, but when a portion of that material is nicked or cut, the conditions are materially changed. It is well known to mechanics that if a slight nick be cut around a bar of iron or steel it can be broken at that poiut by comparatively little force. This is seen every day in the smith's shop in cutting up iron. Take a bar of one and a half inches diameter and cut a slight nick around it, and it may be broken by a few well directed blows of a sledge. But if a bar much lessin diameter be attempted to be broken without first nicking it, the trial will be futile. We have seen precisely the same difference exhibited in drawing bars apart by their ends.

A very little of a substance has very little strength or power of resistance, whether contained in a large mass of the same or taken by itself. Now the force applied to break a clean bar of iron distributes itself through a considerable mass which opposes a considerable resistance. But let this force be concentrated upon a hair's breadth and that will give way as any separate hair's breadth of iron would. The formation of the nick in the surface is the means for this concentration. The forces of the blow passing through the mass, from each side, arrive at the nick, at the bottom of which they meet and unite upon an almost infinitesimal point, and the finer the point or the sharper the cut the less the surface to offer resistance. Now in the case of the screw, the threads are nearly concentric nicks, which offer fine points for concentrating the force of a blow, being the starting of a fracture. Let these nicks be turned out, so as to present a smooth surface, and the force which would have been concentrated at one poiut, is generally distributed over a comparatively large surface, and the reduced diameter, smooth, actually presents more resistance than the larger diameter nicked.

There are some useful lessons to be learned from these facts. One is that a sharp V thread, weakens a bolt much more than one which has a flat bottom, as the point of the thread presents so much smaller a surface for resistance than the blunt or broad bottom. Another suggestion is that the strongest bolt of a given diameter in the screw, is that in which the body under the thread is a very little larger than the shank. Again, a bolt should not be threaded further than is required for the seat of the thread; any further threading is an invitation to a fracture.

TIN LINED WATER PIPE.

In our last issue we mentioned a trial of this new manufacture which took place before a number of mechanics and scientific men, at the works of the company, foot of West Twenty-seventh street, this city. The results of the trial were entirely satisfactory to all who were present.

The pipe differs from the ordinary lead pipe in being, for its caliber, only about half the thickness of lead, and in being lined throughout with pure block tin, not merely washed or plated with it, but being really a pipe of tin enclosed by one of lead, the two being fused or welded together forming one solid whole. The object of the invention is to furnish a conduit for water free from the sanitary objections to which lead is subject, and also to furnish as cheap a pipe as one of lead That this object has been secured is the opinion of our most eminent chemists, physicians, and others competent to judge.

It is not to be denied that even the purest water standing in or passing through lead dissolves more or less of the metal, the oxide of which is a rank poison. This poison affects different persons in a different manner, some withstanding its influences for a long period while others sooner succumb. Such diseases as neuralgia and rheumatism are more prevalent among those living in towns and cities where the water is brought in lead pipes from a common reservoir, than among those who draw water for household purposes with "the old oaken bucket" directly from a well, and these and kindred diseases have increased since the introduction of water by these means.

While lead can be dissolved by the salts held in solution in all water used for domestic purposes, tin is not subject to these chemical changes. Practically it is as free from these influences as porcelain or glass. The additional cost, however, of tin over lead pipe, and the difficulties attending its application, have prevented its superseding lead pipe. This latter difficulty appears to have been overcome by the ingenious applications of Messrs. Colwells, Shaw & Willard in the manufacture of a combined tin and lead pipe.

The pipe is actually stronger than the lead pipe, as was shown by repeated tests on the occasion referred to, although weighing only about half as much per foot. Plumbers have successfully made excellent wiped joints on it with their ordinary solder, although the melting point of tin is much below that of lead; but success in making perfect joints without disturbing the inner tin pipe is assured by the use of a solder peculiarly adapted to it, which is furnished by the manufacturers of the pipe. The method of manufacture is easily understood. A powerful hydraulic press, worked by a steam engine, stands by the side of a furnace over which is a tank containing the melted lead. Directly under the press is a receiver, at the bottom of which a steel die is placed, the aperture in which corresponds with the external diameter of the pipe. The projecting portion of the press piston fits the receiver, and has a mandrel on its lower end corresponding with the inner diameter of the pipe to be formed. A cone shaped block of pure tin having a hole longitudinally through its center into which the mandrel fits, is placed in the center of the receiver directly over the die, the apex of the cone downward. The piston of the press is then lowered until the mandrel engages with the hole in the tin, when melted lead is let in and the receiver is filled to the top of the tin cone. After a few minutes to give time for the melted lead to form a junction with the outside of the tin the pressure is applied and the tin lined pipe comes continuously through the die and is coiled on a reel.

The invention promises much for the welfare of the community at large.

Lock Nuts.

The criticism of our foreign correspondent, "Slade," on the prevalent English mode of arranging the lock nut, in the machines exhibited at Paris, has given rise to a discussion in the English papers. An engineer writes in opposition to placing the thick nut on the outside as a lock nut, maintaining that the inside nut is the one to bear the strain, and must therefore have the strength; while the office of the outside nut is merely to check by its pressure or friction, the disposition of the main nut to work back under the effect of vibration.

The Editor of *Engineering* replies to this view, sustaining Mr. Slade, and explaining that an additional nut is a lock nut only when used against an elastic pressure or a varying strain, and when screwed up so tight as to take the strain off the intermediate nut, and force its thread against the thread of the bolt in an opposite direction to the strain. The pressure of the two nuts against the bolt thread in opposite directions and against each other constitutes the "lock," and the outside nut takes the whole strain until it has yielded sufficiently to bring the inside nut to bear outwardly upon the bolt, when the strain is brought equally upon both. It is therefore evident that the outer nut should be the stronger.

Ericsson's Manual Power Gunboat.

Captain Ericsson has performed many services for his native country, Sweden, for which the legislature has voted him an address of thanks. Among the latest and perhaps the most singular of these services is his plan of a fleet of light draft gunboats for the innumerable and devious channels along the island-girt coast and among the network of lakes peculiar to that country. One of these boats, iron-clad, is already constructed at Motata. The deck is completely below the water level, and is strongly protected with plating. A sort of oval tube or sheath, open at one end, rises above the deck higher than the water. From this points a 15-inch gun, which does not train, but moves according to the position given to the boat by a rudder so constructed as to turn the bow in the wished-for direction. The motive power is applied by the arms of thirty-two men, who act by a simple mechanism on a screw with four flanges. The power thus obtained is said to be thirty to forty per cent greater than when applied to oars. The advantages of this gunboat are cheapness of construction and maintenance (for of course no fuel is required) and exemption from disordered or injured mechanism. The cost is a little over $20,000.

Information Wanted.

Will the Commissioner of Patents have the goodness to inform us the present condition of the class under which surgical instruments, weighing scales, and dentistry are examined? How many cases have been acted upon by the present Chief Examiner in this department since his appointment several months ago? Applicants for patents in this class await an answer.

STRAWBERY AND GRAPE EXHIBITION.—The managers of the American Institute announce their annual strawberry and grape exhibition to be held at their rooms in the Cooper Institute on the 18th and 19th inst. The special premiums offered for the best collections of named varieties, eight in number, amount in the aggregate to two hundred and twenty-eight dollars. The Board of Managers offer prizes of three dollars each for the best quart of eighteen standard varieties. Fruit from a distance may be addressed, prepaid, to the care of John W. Chambers, Secty. No. 22 Cooper Building.