Sorghum Sugar Experiments.

Prof. Collier, late chemist of the Department of Agriculture, and a firm believer in the practicability of producing sugar from sorghum in sufficient quantities and of a quality to supply a great part of the demand for sugar in this country, appears to have awakened the interest of the Agricultural Department in a subject about which it was supposed to have become somewhat inefficient. According to a Washington correspondent of the New York *Times*, Prof. Wiley, of the department, in a forthcoming report, will make public some interesting information about the experiments with sorghum during the last year, and takes a more hopeful view of the subject than Commissioner Loring formerly held. He pronounces erroneous the prevalent impression that every farmer may become his own sugar-maker. Sorghum, unlike sugar beet, contains various non-crystallizable sugars, the separation of which demands much skill and scientific knowledge. Sorghum sugar will have to be made in large factories. The existing factories have shown that it can be made, but how profitably or unprofitably cannot be stated by Prof. Wiley, who suggests that farmers near factories may, in effect, make their own sugar by raising the cane and trading it at factories for sugar.

Cane giving 60 pounds of sugar per ton ought to bring the farmer 35 pounds, the rest of the sugar and molasses going to the manufacturer to pay expenses and yield profit. The profitableness of making sugar from sorghum depends largely on utilizing all waste products. The scums and sediments make manure hardly inferior to guano. Bagasse, or crushed cane, can be turned into manure by being thrown into hog pens, as at Rio Grande, N. J., or it will make a fair quality of printing paper. It is not economical to burn it. If the manufacture of sorghum sugar is proved to be profitable, it will result in supplying to a large extent our demand for sugar; but as sorghum makes a great deal more molasses in proportion to sugar than sugar cane does, the Professor concludes that when there is enough sugar there will be a great deal more molasses than can be disposed of.

Prof. Wiley has made experimentally some fair samples of rum and alcohol from sorghum molasses. Under favorable circumstances one gallon of molasses, weighing 11 pounds, would give 2·75 pounds absolute alcohol, 3·03 pounds of 90 per cent alcohol, and 5·5 whisky or rum. Thus, each gallon of molasses would give nearly half a gallon of commercial alcohol and two-thirds of a gallon of whisky or rum.

As it has been abundantly proved, he says, that sugar can be made from sorghum, the Government should make no further experiments in this direction. Prof. Wiley has tried the diffusion process, and finds it yields 20 per cent more sugar, but at a somewhat higher cost than grinding. The Government, he thinks, should purchase machinery for large experiments in the diffusion process, and should raise its cane somewhere else than near Washington, as land there is expensive and not adapted to the purpose. The Government should also make arrangements with agricultural colleges or other agencies in various States for experimenting with sorghum culture to determine what parts of the country are most favorable to the culture of sugar-producing plants. Prof. Wiley suggests in each State the trial of two acres divided into ten plots—five for sorghum, four for beets, and one for corn—to test for purposes of comparison the general fertility of the soil and the character of the season. The Government ought to carry on for a series of years the process of selection of sorghum seed, in order to secure an improvement in the quality of the cane. It may be stated that the past season proved a disadvantageous one for sorghum sugar making, not only at the Agricultural Department, but generally. The conviction is growing among some of those who have made experiments that sorghum cannot be relied on to make sugar in the extremely Northern States, but that in spite of occasional successes in Minnesota there is a sorghum belt, as there is a corn belt, north of which the crop cannot be relied on.

Railway Bridge Inspection.

Bridges, like car wheels, do not break down without showing signs of weakness long in advance. Careful inspection of wheels at frequent intervals has enabled railways in this country to practically eliminate "broken wheels" from among the causes of accidents, at least those of a serious nature. A bridge failure is admittedly of a much more dangerous character than one resulting from a broken wheel. It would be expected, therefore, that bridges would be much more carefully looked after than wheels; yet, on some roads, even in the vicinity of New York, faulty and dangerous structures of this class have been allowed to stand on main lines for the last five years. Nominally, these bridges have been inspected, and probably the flaws have been reported, but so long as no attention is paid to the defects the inspection is a farce. A dangerous wheel on the same road, if allowed to run under a passenger car, would cause the instant dismissal of whoever allowed the car to proceed, knowing that it was defective.

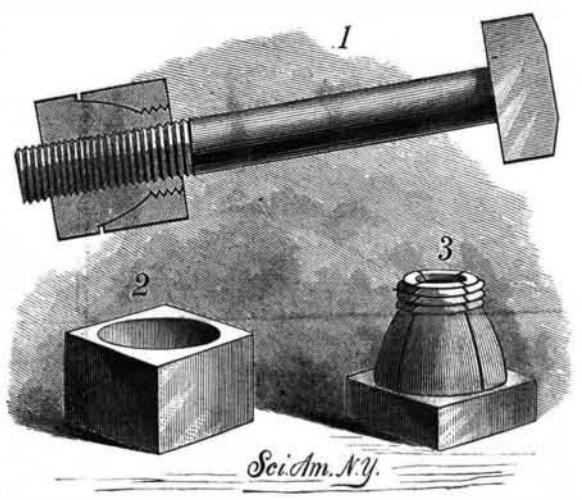
If the true, or inside, history of many bridge accidents could be written, it would be found that numerous warnings had been given and disregarded. The condition of the structures had not been hidden from the officers, and had been continued long after they had passed the point where danger was imminent at each passage of a train.

One of the bridges alluded to as having been a long time defective showed its first sign of weakness by the cracking of a cast iron member. This crack has been slowly enlarging. Another member, through a mistake in placing the braces, is relieved from its proper load under certain conditions, and has been slowly rotating about its horizontal axis. At any moment, however, it is liable to experience a heavier shock or stress than usual and turn over completely, or break from the application of a strain in a manner not contemplated by the designer. These facts have been known to the officers of the road for a long time. Attention has been called to this particular bridge not only by their own inspectors, but by outside engineers.

It is hardly necessary to add that engineers do not generally believe that bridges, roof trusses, buildings, or boilers fail from weakness or decay that could not have been discovered by proper examination. Mysterious causes are no longer admitted by engineers of repute to have a place in engineering science. However, the inevitable conclusion is that failures of all kinds of engineering structures may be anticipated and prevented by taking proper precautions.—*The National Car Builder.*

NUT LOCK.

The bolt is of the ordinary form and of any size of thread. The nut, Fig. 3, is threaded throughout its aperture to fit the bolt, and is formed at one side with a conical extension terminating in a cylindrical portion that is threaded. The extension is formed with longitudinal incisions, of which there are, preferably, four. The washer, Fig. 2, corresponds in width with the extension of the nut, and has its aperture tapered to fit the conical surface, and also has a straight portion that fits the threaded cylinder. These threads correspond in the number to an inch with those on the bolt, and the conical surface is slightly swelled, as shown in Fig. 3. To use the device, the washer is first placed on the bolt against the body to be clamped, when the nut is screwed on the bolt, its extended portions entering the washer until the threads on the end take the threads on the washer; the conical surfaces coming together, the nut is clamped on the



FULWILER'S NUT LOCK.

threads of the bolt. The nut is held fast by the clamping action, and the washer cannot become loose for the reason that it must, to do so, move back against the pressure of the body. This construction gives a long threaded surface to the nut, so that the pressure cannot strip the thread. The smooth conical surfaces commence to clamp as soon as in contact and increase in pressure as the washer moves up the cone.

This invention has been patented by Mr. J. A. Fulwiler, of Lexington, Illinois.

Better Prospects.

It is evident to one who gets about among the manufacturers that there is a more hopeful feeling regarding business than there was at the beginning of December. Machine tools of the standard sorts are ordered to a much larger amount than at that time, and some establishments are keeping their men busy in getting a stock of these tools ahead, which, of some makes, are rarely a drug in the market. The demand for special tools has somewhat fallen off, as might have been expected when the newly started manufactories of the last building season were completed, but there is a call for small machine tools fully as imperative as a year ago, one manufacturer of small machine tools and appliances reporting that he has all that his means will enable him to undertake, and another, who commands the production of two styles of patented planer and lathe tools, stating that two men on the road are doing well for themselves and for him in their sale.

Tobacco and the Pulse.

Dr. Troitski has made a number of observations upon the effects produced on the temperature and pulse by smoking. He found that in every case, varying according to the condition of the individual, there was an acceleration of the pulse rate and a slight elevation of temperature. If the average temperature of non-smokers were represented by 1,000, that of moderate smokers would be 1,008; and while the heart in the former case was making 1,000 pulsations, in the latter it would beat 1,180 times. It is in the latter effect that he thinks the danger of tobacco smoking is manifested.—*Journal de Medecine de Bruxelles.*

How to Make Burnt Cork.

The popular impression about the application of burnt cork by minstrel performers is that it is rubbed on the face and hands of the performer from a cork whose end is charred in a convenient gas jet. This is incorrect. To supply the burnt cork used by minstrel performers of this city occupies the entire time and earnest attention of one interesting character. A little man, whose place of business is on the curbstone on the north side of Pine Street, explained to a reporter the process of making it.

"I first gather my corks. I get them from the big bottling houses, who buy lots of bottles, many of them with corks that wouldn't keep the air out of wine or beer.

"When I get ready to burn, I put the corks into those three washboilers you see there with holes punched in their sides and bottom, sprinkle alcohol over them, and set them afire. Then I fill one of those muslin sacks with the charred cork, and knead the sack in this barrel of water. That forces the powdered charcoal through the sack into the water.

"When I have worked all my charred cork through this sack into the water, I drain the water through a close canvas sack you see on that frame there, and what remains in the canvas sack is ready for the artists. I put it up in one pound tins, and they use it out of them. When a performer is ready to 'black up,' as they call it, he takes a little of this black paste in his hands and washes his face, neck, and hands in it, and he is blacked as you see him on the stage."—*San Francisco Call.*

A Remarkable Phenomenon seen in Porto Rico.

A correspondent in Humacas, Porto Rico, describes a beautiful comet observed by himself and a few friends in Humacas on the 21st of November, 1883, between nine and ten o'clock in the evening. He writes that "its head inclined to the west and its tail extended majestically due east, and at an altitude of about 35° to 40°." It was observed on "three successive nights, but on the fourth night it disappeared."

The writer asks for information, and asserts his belief that he has seen again the great comet of 1882. His conclusion is an utter impossibility. The great comet of 1882 is now far beyond the reach of mortal vision. Moreover, it was visible in the morning instead of the evening. The latest observations of this comet were made by Dr. Schmidt at Athens, on the 27th of April; by Mr. Atkinson, of New Zealand, on the 6th of May; by Mr. Maxwell Hall, at Kempshot, Jamaica, on the 6th of May; by Prof. Ricco, at Palermo, on the 12th of May, when it was extremely faint. The very last observation was made by Mr. Thome, assistant at the Cordoba Observatory, in South America, where it was seen until the 1st of June, and described as "an excessively faint whiteness."

It was announced that this comet would be in a position during September and October where it would probably be visible in a powerful telescope in the early morning, when the moon was out of the way. We have heard no report of its visibility, and therefore conclude that it is winging its flight through the star depths to return no more until the passage of several hundred years will complete its circuit, and bring it safely back to our domain.

Neither can the comet seen at Porto Rico be the Pons-Brooks comet, now plainly visible in the northwest as a small nebulosity with a very small tail when seen by the naked eye; and as a nebulous mass with a bright nucleus and a well defined tail, when seen in a telescope.

We cannot therefore throw any light upon the celestial phenomenon seen in Porto Rico by our correspondent and his friends. A comet such as he describes would have been seen elsewhere, and its presence would have been telegraphed all over the civilized world. We should like a drawing of the strange visitor and its position among the surrounding stars. We should like also to know whether the observations were made with the naked eye or with the aid of the telescope.

Perhaps the Java earthquake had some connection with the beautiful phenomenon. The superb sunrises and sunsets occurring nearly at the same time are traced to this source by scientific men of the highest authority. Cosmic dust takes on wonderful forms, under the right conditions for development.

A Young Electrician's Theory.

An Ohio boy, who wishes to make electricity his life study, sends us his theory of its generation. He believes it is made by the earth being hot in the interior acting on the cold at the poles, which are supposed to be of platinum; that thus electricity is given off, not only to make the auroras so frequent in high latitudes, but to charge the whole stratum of air around the globe, the atmosphere in this way acting as a storage battery.

In regard to matters where the wisest have thus far obtained so little satisfaction, our young correspondent expresses himself in a way which indicates a thoughtful observance of what is going on in this most interesting field.

THE Oxide Bronze Company, of Philadelphia, send us certificate of result of testing, for tensile strength, of a sample of their oxide bronze. The sample tried was of the area of 0·5574 sq. in. in cross section, and broke at 20,350 lb., equal to 36,502 lb. per sq. in. This bronze is a new composition for which many advantages are claimed.