

HOW TO GALVANIZE IRON.

Galvanizing iron sheets is quite an industry by itself and the product can be bought cheaper than it can be made on a small scale. There are, however, times when it is worth while to coat small articles of iron with zinc to prevent rust, etc., and the description of a way to do this may be valuable to some of our readers. The *Iron Age* has lately had occasion to examine the processes and gives the following: The articles are to be first cleaned by placing them in open wooden vessels, in water containing three-quarters to one per cent. of common sulphuric acid, and allowed to remain in it until the surface appears clean, or may be rendered so by scouring with a rag or wet sand. According to the amount of acid, this may require from six to 24 hours. Fresh acid must be added according to the extent of use and of the liquid. When this is saturated with sulphate of iron, it must be renewed. After removal from this bath the articles are rinsed in fresh water, and scoured until they acquire a clean, metallic surface, and then kept in water in which a little slacked lime has been stirred until the next operation. When thus freed from rust, they are to be coated with a thin film of zinc while cold, by means of chloride of zinc, which may be made by filling a glazed earthen vessel of about two-thirds gallon capacity three-fourths full of muriatic acid, and adding zinc clippings until effervescence ceases. The liquid is then to be turned off from the undissolved zinc and preserved in a glass vessel. For use it is poured into a sheet zinc vessel of suitable size and shape for the objects, and about 1.30 per cent. of its weight of finely powdered sal ammoniac added. The articles are then immersed in it, a scum of fine bubbles forming on the surface in from one to two minutes, indicative of the completion of the operation. The articles are next drained, so that the excess may flow back into the vessel. The iron articles thus coated with a fine film of zinc are placed on clean sheet iron heated from beneath, and perfectly dried, and then dipped piece by piece, by means of tongs, into very hot (though not glowing) molten zinc for a short time, until they acquire the temperature of the zinc. They are then removed and beaten, to cause the excess of zinc to fall off.

SUCCESS WITH MINERAL OILS.

Inasmuch as our State has begun to develop its resources of mineral lubricating oils, it is well to examine their value as compared with the organic oils largely in use. At the late meeting of the Railway Master Mechanics' Association, there was rendered a report of a committee appointed to examine into and report on the subject of lubricants. They recommended a good quality of natural earth oils as the best to use for lubricating machinery and journal boxes. It was less expensive and of a better quality than other oils. When treated so as to reach 28° of gravity it was found to work with perfect success, even on so sandy a road as the Lake Shore. It had been reported on favorably from Canada in the North to Kentucky in the South. A test of various grades had been made with the oil-tester on the Lake Shore road; sperm, lard and tallow were used, and none of them found to possess qualities which render their use advisable. In their experiments the committee used a machine the size of a regular axle-box, and 50 drops were poured in at a temperature of 60°, and the wheel was allowed to revolve at a rate of speed equaling 25 miles per hour until a temperature of 200° was reached. The length of time, number of revolutions and amount of friction were all noted and placed in the form of a table. He called their attention to the result obtained from tests with paraffine, which costs from 25 to 30 cents per gallon, and which has been used on the railroads in preference to lard oil. Paraffine costing 25 cents, with which six experiments had been made, showed 24 minutes required to reach the maximum temperature, during which time it gave 11,685 revolutions; castor oil, costing 81.25, which required 28 minutes to reach the temperature allowed, gave 12,946 revolutions; manufactured oils A, B and C, costing 35 cents, 90 cents and 25 cents respectively, required 19, 19, and 17 minutes, giving from 9,285 to 9,653 revolutions; sperm and tallow required only 17 minutes to reach 200° temperature, with less than 8,000 revolutions.

VELOCITY OF LIGHT.—The 13th volume of the "Annales de l'Observatoire de Paris," contains the memoir of M. Cornu on the determination of the velocity of light, embracing a complete recital of the experiments made in 1874 between the observatory of Paris and the tower of Montlithery. Everything was done to obtain the greatest possible precision, by perfecting the method of the toothed wheel, which was devised by Fizeau in 1849. The method of observation, the construction of the various articles of apparatus and their mode of acting have been discussed in their most minute details, with a view to ascertain the causes of error, and to determine the most favorable conditions for their elimination. The agreement of results obtained under the most varied circumstances, shows the importance of this discussion. Care was taken in all cases to prove that the deviations followed the law of accidental errors, a verification which is commonly neglected, but without which the calculus of probabilities cannot be legitimately applied. The result of the experiments gives, for the velocity of light, 300,400 kilometers per second. This gives for the solar parallax, 8.88", if we adopt Delambre's equation of light, (492.26) or Bradley's constant of aberration, (20.25"), 8.86", with Struve's constant, (20.445").

MAKING CRACKED WHEAT.—*Millstone* replies to a query as follows: "Cracked wheat is usually made on small buhrs, portable mills, of sharp porous French buhr stone, being best adapted for the purpose. The mills most generally used will crack about 10 to 15 bushels per hour, and the cracked wheat is then passed through a reel, or series of reels, covered with different numbers of wire to grade it. The apparatus required, of the capacity referred to, will cost about \$400, including the mill; or it can be furnished of a less capacity for less price."

CUTTING UNCLE SAM'S TIMBER.

The Government has issued the following circular, which we print for the benefit of those whom it may concern: The Secretary of the Interior has concluded to change the method formerly adopted for protecting the timber on the public lands, by which you were made agents for that purpose within the limits of your respective land districts as per circular of December 24th, 1855. Pursuant to the directions from him of the 5th ultimo, the instructions of that circular are hereby revoked.

Hereafter, as it may be found advisable, from time to time, for the end in view, clerks or employees will be detailed from this office to act under instructions of the Commissioner in ascertaining when, where and by whom depredations have been committed upon the public lands, and to report to him the facts in each case.

If, upon an examination of the reports so obtained, the Commissioner finds that the facts elicited in any case warrant the commencement of legal proceedings to punish the trespassers, or to collect damages for the waste already committed, or both, he will report the same to the Secretary of the Interior, with his opinion thereon, in order that such further proceedings may be had in the premises as the case may require.

The clerks or employees detailed as aforesaid will not be permitted to make any compromise for depredations committed on the public lands. If any propositions are submitted to them with that object, they will be required to report the same to this office, with a full statement of the

THE TEA PLANT.

Our engraving gives an excellent exhibition of the analysis of the plant botanically. As we read the studies of the botanist, it is now generally agreed that there is not sufficient reason to give the tea plant a genus of its own, but it must be classified as a species of the genus *Camellia*, and its name is *Camellia thea*. The tea plant differs from the other species of *Camellia* grown in this country, according to one authority, by having "longer, narrower, thinner, more serrate and less shiny leaves. Its flowers are axillary and nodding, and though only about an inch across, closely resemble those of a single *Camellia*. The sepals and petals are usually five, the stamens numerous, a portion forming by their united bases a cup, within which are numerous separate stamens. The fruit or pod is usually three-celled, with a single large seed in each cell. These points are well shown in the engraving. At the lower left hand corner are shown the tripartite pistil, the cross section of the three-celled ovary, and the three-celled seed-pod, when fully grown. At the right lower corner are sections of the seed, with and without its covering, and one seed split to show the position of the germ.

Such, in brief, is the plant which has given China a name throughout the world. Of the growth of it in China we have the following interesting description in the words of a traveler:

In the black tea districts of China, as in the green large quantities of young plants are



THE CHINESE TEA PLANT.

facts in the case, showing the nature and extent of said depredations, when and by whom committed, the amount and value of the timber when cut, and the value of the land in its present and former condition, all of which, together with the opinion of the Commissioner, will be submitted to the head of the department for further consideration.

If, in any case, the emergencies should seem to require more prompt action than is contemplated in the rules above indicated, in order to arrest the offender, or to secure the Government for the damages suffered, it will be the duty of the clerk or employee detailed to act in the matter to make direct application to the United States District Attorney for the district in which the waste was committed to institute the proper legal proceedings for that purpose. This course, however, must be taken only in cases where the evidence is clear and indisputable.

The foregoing is communicated for your information. You will observe therefrom that you are not hereafter to act as agents for the protection of the public timber, although your cooperation is expected whenever you may be called on to render assistance to officials charged with the duty.

STEEL HAWKER.—A steel wire hawker, 150 fathoms long and 14 tons in weight, has been supplied to the iron-clad frigate, *Alexandra*. When coiled it occupies a space 4½ feet by 4½ feet. A hemp hawker would be double the weight and occupy six times the space.

PROGRESS IN ENGLAND.—In 1853-54 the estimate for education, science and art in Great Britain was £578,000; this year the estimate reaches £1,546,000.

barron surface by their rich dark-green leaves. When young, they are allowed to grow unmoisted for two or three years, or until they are well established and producing strong and vigorous shoots. The practice of plucking the leaves is very prejudicial to this shrub, and the natives always take care that the plant shall be in a vigorous and healthy condition before this operation is commenced. Even when the plantations are in full bearing they never take many leaves from the weaker plants, in order that their growth may not be checked. For, under the best mode of treatment and on the most congenial soil, they ultimately become stunted and unhealthy and are never profitable when old. Hence, in well managed tea districts, the natives annually remove old plantations and supply their places with fresh ones.

A NEW TYPE OF MERINO SHEEP.

It appears from recent publications that the Merino sheep is either showing disposition to revert to the type from which it sprang or else is putting forth a higher development. We commend the following, which we find in the *American Cultivator*, to the attention of our sheep herders. We should like to know if they have discovered in their herds any tendency like that described. The *Cultivator* says: The new breed of sheep, Manchamp, or Silky Merino, is exciting much interest throughout the country, and causing considerable inquiry concerning its origin and history.

Mr. George William Bond, a wool merchant of this city, some 12 months since called the attention of the Boston Society of Natural History to the discovery of a similarity of the wool of the French Manchamp race and that of the Arabian stump-tailed, fat-rumped race or Mecca sheep.

Dr. L. Fitzinger, at the Imperial Academy of Vienna, described the Mecca sheep as having its whole body covered with short, smooth, close-lying straight and stiff shining hairs, which are shorter on the face, ears and legs, and beneath these there is found a short, peculiarly fine, wavy and elastic wool, which is finer than that of most known races of sheep.

Mr. Bond obtained a skin of this last-named race and found that the covering exactly agreed with Dr. Fitzinger's description, and a microscopic photograph of the wool, magnified about 200 times, showed that the fiber measures only about 1-2000th of an inch in diameter, which is as fine as the finest Silesian wool. Comparing this wool with a sample of another lot sent from New York, and also with that of the Manchamp sheep, an exact correspondence was discovered. Mr. Bond urges that the Manchamp sheep might be simply a case of atavism or reversion to an ancient type—the old Arabian sheep.

The Merino sheep is undoubtedly an animal that either from mode of culture, or some accidental cause, has lost the hairy coat of its covering, and the wool has been furnished with a liberal supply of "yolk" or grease to meet the exigencies resulting from this change. If descended from the Arabian sheep, may not the fat deposit of the tail have been diverted to produce the greater amount of "yolk" required to make this wool covering adequate for the protection of the sheep from the external influences to which it was subjected?

The following letter, kindly handed us by Mr. Bond for publication, contains a strong confirmation of this theory of reversion, and it is to be hoped, should the sheep herders of this country discover among their Merino flocks any marked specimens developed according to our description of the Manchamp sheep, that they will inform us of the facts, that we may aggregate a mass of testimony on this important subject leading to valuable results. It was written by J. L. Currie, of Australia:

With regard to the first appearance of the silky type, I must go back to the historical introduction of the Merino sheep into the Australian colonies.

Briefly, this occurred towards the end of the last century, and the source from which they were derived was a small flock, presented by the king of Spain to George III, of England—I believe the highest type of the breed. A few of both sexes were procured, by a Captain McArthur, and introduced into Australia, and from that source all the best flocks now in existence in the colonies are sprung.

About 20 years ago, I was fortunate enough to procure 10 rams, of very high class, from this flock. After this I occasionally observed cropping out a peculiar sheep, with a bright, silvery, delicate-looking, lustrous fleece, straight and long in the fiber, showing a most marked peculiarity—the wool being more like delicate, fine, lustrously white, silky hair. In classing the ewes for breeding purposes, these were generally rejected, on account of their delicate appearance and supposed delicate constitution. At last it occurred to me that it might be worth while to see if anything could be made of them, and, about 10 years since, on the appearance of a ram with this characteristic very decidedly marked, I collected a few ewes and put him with them. The samples sent are from the progeny of this coupling.

The result, so far, has been the establishment of a breed with very marked characteristics, viz.: a long, lustrous, straight wool, a heavier fleece, and a larger, more symmetrical and more vigorous sheep. It has not been followed out by any one but myself, but, on inquiry, I find that among all flocks sprung from the same source (the Spanish Merino), animals having the same characteristics have been observed. The fair inference, therefore, is that it is to the Spanish Merino it is due; whether reversion to a lost type, or nature under different conditions developing a different and higher type, must, I think, be matter of conjecture. Since seeing the samples of Manchamp Merino wool, which you so kindly sent, I have no doubt that the sheep from which that breed was produced, and those to which I refer, are essentially of the same character, from the similarity of their wool and from being procured by or from the same influence, which, from its frequent repetition, I cannot regard as freak of nature, but must be sought for from other causes, either reversion or a higher development.

yearly raised from seeds. These seeds are gathered at maturity, in October, mixed immediately after and packed in sand and earth, in which they are kept during the winter months. In this manner they are preserved fresh until spring, when they are thickly sown in some corner of the farm, whence they are afterwards transplanted. Sometimes they are sown in rows where they are destined to grow, and consequently do not require to be removed. When about a year old the plants are usually from nine inches to a foot in height and are ready for transplanting. They are set in rows about four feet apart, in bunches or hills, three or four feet asunder along the rows, with five or six plants to each bunch. In some cases, however, when the soil is poor, as in many parts of Woe-shan, they are planted very close in the rows and appear like hedges when fully grown. The young plantations are always made in the spring and are well watered by the rains which fall at the change of the monsoon in April and May. The damp, moist weather at this season enables the plants to establish themselves in their new quarters, and they afterwards require but little care, except in keeping the ground free from weeds.

When the winters are very severe, the natives tie straw bands round the young tender shrubs to protect them from the cold, and to prevent them from cracking or bursting from frost or snow.

A tea plantation, when seen at a distance, looks like a little shrubby evergreen. As the traveler threads his way among the rocky scenery of Woe-shan, these plantations, which are constantly seen dotting the hillsides, afford a pleasing contrast to the strange and often