

Railroad Bridge Across the Mississippi.

On the 7th of November the formal opening of the Quincy (Ill.) Railroad bridge across the Mississippi river took place, making an unbroken railway line from the East, via Chicago, to Kansas City on the Missouri. When the bridge at this place shall be finished the through line will penetrate the heart of Kansas. We copy from the *Chicago Railway Review* the following description of the bridge:

"The first stone was laid Sept. 25th, 1867, the last, August 5th, 1868. Its total length, including embankments, from the Chicago, Burlington & Quincy to the St. Joseph Railroad tracks, is about two miles. The draw portion of the bridge spanning the main channel of the river consists of two spans of 160 feet each; and the main bridge consists, otherwise, of two spans of 250 feet, three of 200, and eleven of 157 each—making a total, with the mason work, of 3,250 feet. The embankments and trestle work between are 1,400 feet in length. Bay bridge, 613 feet; one draw, 190 feet long, and four spans of 85 feet each. The bridge is elevated ten feet above high water mark, and twenty feet above low water mark, on stone piers. The masonry and foundations are the work of the Bridge Company, under the direction of the Chief Engineer. The superstructure is of iron, on the Pratt truss principle. Every piece of wrought iron in the ties, links, bolts, etc., was tested in a hydraulic press up to 23,600 pounds to the square inch, and struck with a hammer, while under tension, before being used in the bridge. Theoretically, the strength before the effect of the load becomes apparent in stretching is 28,000 pounds to the square inch; while the ultimate strength is 60,000 pounds to the square inch. The bridge is so proportioned that a train of two locomotives and the heaviest freight cars strain the iron only about 7,500 pounds to the inch."

The tests made were these:

Three of the heaviest locomotives were coupled and placed at rest centrally upon the span 250 feet long, and the deflection or yielding of bridge very accurately observed by means of instruments. The total weight of the load was 300,000 pounds, and the maximum deflection at the center of the span was 2.4223 inches, being one-sixteenth of an inch less than the deflection previously calculated.

The same load was then placed upon a span 157 feet long, and a deflection produced of 1.375 inches, which varied but little from the result of previous calculations.

The three locomotives, still coupled, were then run over the 157 foot span several times, at rates of speed varying from ten to sixteen miles per hour. The deflection produced was 1.406 inches, being an increase of only 3.1 inches over the deflection while at rest. Probably no severer strain than the above will ever be applied to the bridge in actual use. In each case, on the removal of the load, the bridge at once resumed its previous form.

The strain applied to-day was 5,100 pounds to the square inch of wrought iron, and 5,800 pounds per square inch of cast iron.

On the 157 feet span, the strain applied was 9,000 pounds to the square inch on the wrought iron, and 10,200 pounds to the square inch on cast, being about one-quarter more than the strain produced by the passage of the heaviest freight trains. All the wrought iron had been tested before being used by a strain of 23,000 pounds per square inch. Specimens of the wrought iron which were subjected to the ultimate strain, broke only at from 60,000 to 80,000 pounds per square inch. The total cost of the structure was \$1,500,000.

Improvements in Steam Navigation--How they will Affect the Old World.

The *London Spectator* has the following:

"Suppose it true, as many men of mark and science believe, that the next great step may be in sea-going steamers, that international communication may be accelerated as internal communication has been, that we may yet see New York brought within two days' journey of Liverpool. The probability is that in ten years every social condition now existing in Europe would have ceased to exist, that the millions who toil for others, and on whose toil modern society is built, would choose to toil for themselves, would precipitate themselves in a rush, to which all the movements of mankind have been trifles, upon the new world. Suppose the population of Britain and Germany reduced to ten millions each—a change less in magnitude than that which has occurred in many countries—and these ten millions only retained by advantages as great as the new world can offer, what would all the changes of the past half century be to that? This may happen, even without any application of Stephenson's great idea—the one idea he never worked out—that if engineers, instead of trying to increase the power applicable to driving ships, were to reduce the friction which retards ships, the world would speedily be one great parish. This writer, who has seen many countries and lived among many races, seriously believes that of all the dangers to which Europe and European society are exposed none is so formidable as the passion for emigration; seriously doubts whether, if education once spreads in Europe, it will be possible to retain its population cooped up in their narrow and half exhausted corner of the world. We think, we English, that we know what emigration is; but we know nothing about it, have no idea of the changes it would involve if aided by the whole force of the masses then in possession of the supreme political power. Suppose those five-sixths of the Englishmen who now work for others choose to go elsewhere and work for themselves. The change between Waterloo and Sadowa would be very slight compared with the change between 1868 and 1918, and there is not a sensible man in England who will declare that alteration beyond the reach of thought. Why should not emigration in England and Germany attain the height it has reached in Ireland, and the masses insist on aiding it through the national fleets. The Irish would if they had the power, and the British have this

year the power conferred on them. We say nothing of a discovery which, if it is ever made, will remodel all human society, slowly pulverize all differences among nations, fusing the world into one people, and immediately destroy all existing political arrangements—the discovery of a means of maintaining and guiding a raft ten feet or so in the air; for we cannot resist a totally unreasonable impression that the discovery will be made; that progress will not in our time make that astounding leap. Apart altogether from that, there are physical forces now at work strong enough to change the whole face of the world, by shifting its populations."

PRACTICAL RECIPES.

WHITEWASH FOR OUTSIDE WORK.—Take of good quicklime half a bushel, slack in the usual manner and add one pound common salt, half a pound of sulphate of zinc (white vitriol), and one gallon of sweet milk. The salt and the white vitriol should be dissolved before they are added, when the whole should be thoroughly mixed with sufficient water to give the proper consistency. The sooner the mixture is then applied the better.

CHAPPED HANDS, ETC.—In this season of cold winds many are suffering from chapped hands, lips, and faces. The following course will scarcely fail to cure, and is almost certain to prevent these inconveniences. Wash the chapped surface with fine soap, and while the soap is on the hands place in the palm a tablespoonful of Indian meal. Before removing the soap, scrub the hands thoroughly with the meal and the soapsuds, then rinse the hands thoroughly with soft tepid water until all trace of the soap is removed, using a little meal each time until the last, which will aid greatly in removing the soap and dirt from the cracks in the cuticle. Finally, wipe the hands very thoroughly and rinse them in enough water to moisten their surface, in which has been poured a quarter of a teaspoonful of pure glycerin, dry them without wiping, using a mild heat, and rubbing them until the water has all evaporated. By this process, the dirt will have been all removed, and in its stead will remain a coating of glycerine. The effect of this application will be apparent by morning, if it be made upon retiring to rest; and whoever tries it once will do it a second time. The glycerin must be pure, however, or it will irritate instead of healing.

TO REVIVE THE COLOR OF BLACK CLOTH.—Take of blue galls, bruised, four ounces; logwood, copperas, iron filings, free from grease, and sumach leaves, each one ounce. Put all but the iron filings and copperas into one quart of good vinegar, and set the vessel containing them in a warm water bath for twenty-four hours, then add the iron filings and copperas and shake occasionally for a week. It should be kept in a well-corked bottle. It may be applied to faded spots with a soft sponge. It is good also to restore the black color of leather when it turns red, the leather being previously well cleaned with soap and water.

TO PREPARE CASKS FOR CIDER.—Cider should never be put into new casks without previously scalding them with water containing salt, or with water in which pomace has been boiled. Beer casks should never be used for cider, or cider casks for beer. Wine and brandy casks will keep cider well, if the tartar adhering to their sides is first carefully scraped off and the casks be well scalded. Burning a little sulphur in a cask will effectually remove must.

TO MAKE A PURE CARAMEL.—The commercial caramel is a solution of burnt sugar in water. It is rarely pure, often containing undecomposed sugar and bitter compounds generated during the heating process. To purify its solution, it should be filtered and alcohol added until no precipitate is thrown down. The precipitate is a dark brown powder, in many instances almost black, and is pure caramel, soluble in water, but insoluble in alcohol.

TO FILL HOLES IN IRON CASTINGS.—Sulphur one part, sal-ammoniac two parts, powdered iron turnings eighty parts, make into a thick paste with water immediately before using. The materials should also be kept separate until the time they are wanted.

A NEW TOY FOR YOUNG AND OLD.

Probably there is not one of the readers of the *SCIENTIFIC AMERICAN* who has not derived amusement from the spinning of tops; and the variety of their forms and performances is so great that we might have supposed the field of invention had been fully cultivated and reaped; but after seeing the old toy adapted to exhibit mechanical and optical effects, we expect still further advance in "top dressing"—to continue our figure of cultivation.

The Japanese have latterly astonished us with their performances in the top department, but we think they have not exhausted the powers of entertainment from top-spinning, judging after the novel exhibition we have witnessed, by one of our old correspondents, whose signature to several articles on amateur turning some of our subscribers will recognize.

He has penned a description of the top he employs, on which, after perusal, any of our young amateur friends may exercise their ingenuity in imitating. We promise that they will not only be interested but entertained; and as the inventor declines to take out a patent, and prefers to offer its free construction to our friends in the toy manufacture, we ask a careful examination of his device, statement, and explanation.

A PRACTICAL acquaintance with the hand tool will save the machinist many hours of vexatious labor.

The Tea Trade in New York.

A correspondent of the *Troy (N. Y.) Times* gives some interesting facts in regard to the tea trade of this metropolis, some of which we referred to on page 122 of No. 8, current volume, *SCIENTIFIC AMERICAN*. He says:

There are a few places where we are wont to drop in and take a cup of tea, which to a wanderer in this great labyrinth is very acceptable. We do not refer to the restaurants, which are very well if one can do no better, but to the tea brokers in Wall street and that vicinity. These gentlemen always have some extra qualities on hand, and the kettle is never off the boil; and here one can brew a cup of gunpowder, young or old hyson, or breakfast tea in a minute by the watch. Formerly teas were sold at auction, and in this way a cargo of ten thousand chests could be disposed of in an hour. The great center of the tea trade was then the Phenix salesroom, in the *Journal of Commerce* building, for which a rent of \$40 was exacted for each sale. The sample chests were placed on examination one day previous, and each chest was numbered and then tapped with an auger for sampling, while a pile of catalogues lay on the desk. On some occasions over two hundred sample chests might be found, and it was no small task for a grocer to examine this array of different qualities in a single day. But it had to be done, and hence the room would be crowded, each man chewing and smelling, and in every possible way reaching an estimate of value which he penciled on his catalogue so as to be prepared to bid. Some dealers took the liberty to send boys for samples which they tested in their own offices, the samples becoming the perquisites of the clerks, and sometimes amounting to a large value. The floor of the salesroom would be covered with tea dust and the general waste of the article would be very great, averaging six hundred pounds at each auction. The purchase of tea under such circumstances was a great trial of skill, the bidding being for the first choice out of ten lots, and each subsequent choice being put up until the whole was disposed of. Some having got the bid would choose a lot whose inferiority would at once attest their ignorance and call forth a general smile of ridicule.

The autioneer on these occasions was almost invariably the late Lindley M. Hoffman, whose eloquence on the stand was only equaled by his grace of action. He was a small man, full of motion, which, in his case, was like the performance of an acrobat. At one time he would be on one leg, at another both arms would be over his head, while his whole body would be convulsed with excitement. He had a marvelous memory of name and face, and amid a hundred voices would discover the first claimant. We have seldom been more rapt by any oratory than by his magic performance, and we can understand the full meaning of that man who said he would rather hear Hoffman sell a cargo of teas than attend the best opera.

With the death of Hoffman, tea auctions went out of use and the present fashion of brokerage commenced, with which importers are generally better pleased. They save the waste, which is at least equal to five hundred dollars on each sale, while the auctioneer's fee and rent of salesroom are two hundred dollars additional. There are about a half-dozen tea brokers here, and all tea imported into this city, with a very few exceptions, passes through their hands. Their offices contain hundreds of samples placed in the boxes, and they can in an instant show a purchaser the grade he may require. This is tested by making a cup of tea, the drawing being invariably of the weight of a five cent silver coin, which always rests on the tiny scale. Tea tasting is exceedingly hard on the nervous system, and while it may be very pleasant for us to drop in and take a casual drink, it is a very different thing to taste a hundred samples in a day. No one who has not a very enduring constitution can long maintain this continual stimulus. One of the best tea tasters in America is a nervous, timid man, who should have been very rich, but he is not, and never will be. He deals in the article, but in such a small way that it does not amount to a success. Had he possessed nerve to operate boldly, he might have been a millionaire; but as it is, after thirty years of trade, but little removed from the foot of the ladder. He has a rare gift, but it has been of little use.

Tea, when sold by an importer, is always weighed by a city weigher, who receives a fee for each package. The fees on a cargo amount to about \$200. Down weight being always given, the jobber generally can gain a pound on reweighing it. As a rule, a cargo of tea stored for one year will gain enough by absorbing moisture to pay the interest on the capital. Hence some importers make a rule to sell no tea until it has been stored a year. We have known teas held in New York five years and then sold for nearly half less than had twice been offered for them.

Every cargo will be more or less damaged by water, and these teas are sold at auction by the underwriters. They are bought by parties to re-manufacture, which is done by coloring them with Paris green and drying them in maltkilns. They are retailed at what are called "cheap stores," where the poorest class do their trading, and where damaged goods generally find a market. We well remember the wrecking of an Indian off the Jersey coast, part of whose cargo was brought up reeking with salt water, and the chests were knocked to pieces and emptied on a large sail which had been spread in the street. Here we saw a mass of tea forty feet square and a foot deep, which brought about five cents per pound, and was not worth even that petty sum. Bad as it was somebody used it. The restoration of damaged tea is now a regular business, in which a number of men find employment, and thus live by poisoning others.

A Horse in Battle.

Kinglake, in his "History of the Crimean Invasion," gives the following graphic description of a horse in battle:

"The extent to which a charger can apprehend the perils of a battle-field may be easily underrated by one who confines his observation to horses still carrying their riders; for as long as a troop-horse in action feels the weight and hand of a master his deep trust in man keeps him seemingly free from great terror, and he goes through the fight, unless wounded, as though it were a field day at home; but the moment that death or a disabling wound deprives him of his rider, he seems all at once to learn what a battle is—to perceive its real dangers with the clearness of a human being, and to be agonized with horror of the fate he may incur for want of a hand to guide him. Careless of the mere thunders of guns, he shows plainly enough that he more or less knows the dread accent that is used by missiles of war while cutting their way through the air, for as often as these sounds disclose to him the near passage of bullet or round-shot he shrinks and cringes. His eyeballs protrude. Wild with fright, he still does not commonly gallop home into camp. His instinct seems rather to tell him that what safety, if any, there is for him, must be found in the ranks; and he rushes at the first squadron he can find, urging piteously, yet with violence, that he too by right is a troop-horse—that he too is willing to charge, but not to be left behind—that he must and he will 'fall in.'"

This almost equals the superb description of the war-horse in Job.