

## Correspondence.

## The Safety of the Eiffel Tower.

To the Editor of the Scientific American:

In reading your various notices of the building of the Eiffel tower in Paris, I have been unable to find any estimate of the probable oscillation which will be set up in the tower by intermittent gusts of wind. I have frequently noticed that where strong winds have passed over country covered with large trees, some of the trees were broken short off, while others standing close to them, with apparently a larger surface of head exposed to the wind and a smaller diameter of solid wood in the trunk, have remained uninjured.

Now, I think the only possible explanation of this is that the time of the oscillations of the trees that were broken off happened to correspond with the time of the intermittent gusts of wind, so as to increase the effect of the pressure enormously, while in those that remained uninjured the times of oscillation and wind pressures did not so correspond. If this theory be correct, with a tower so high as that which is building at Paris, and of such a material as iron, will not the time of the oscillations set up by intermittent gusts of a high wind be sure, sooner or later, to correspond with that of the wind gusts, and when this happens, no matter how firm the foundations or how strong the material of construction, will not the whole building inevitably collapse? With the gusts of wind so timed as to increase the oscillations of the tower, the weight of the structure would increase the danger instead of being an element of safety. W. E. ABBOTT.

Windsor, New South Wales, Australia.

[While our correspondent points out what is certainly an element of danger, it is one that exists for all structures. If smaller towers withstand it, the Eiffel tower presumably will be built of such strength and elasticity as to resist the rarely occurring synchronous blasts of air.—ED.]

## Mining Frozen Ground.

In speaking of the Yukon River country, the *Alaska Free Press* says: The ground there is covered to some depth with a thick matting of moss, which is impervious to the sun's rays, and, in consequence, when the ground underneath once becomes frozen it remains so. To obviate this very serious drawback, the miners have set fire to the moss, which in summer becomes as dry as tinder to a depth of several inches, and thus from the heat of the fire, and being uncovered and exposed to the sun and atmosphere, it is thought that in a short time a vast amount of now frozen gravel will be thawed out sufficient to wash. Should this be the case, there is room enough on Forty Mile Creek and its tributaries for 1,000 miners. There is no reason to doubt (and the boys from the Yukon do believe) that other creeks that put down from the Alaskan range in that neighborhood are equally as rich as Forty Mile Creek, but of course nothing whatever is known of them and will not be until explored. Alaska is a great, big country, and years will come and go before its resources are shown up. The trip to the Yukon is a long and difficult one, and three-fourths of the miner's time is consumed in going to and from the country. Provisions have always been scarce, and the miner has always had to rely upon his back and boat as a means of transporting them into the country. With the great difficulties experienced in getting into the interior, it is no wonder that it has not been shown up ere this. Alaska yearly pays into the treasury enough to more than defray the expenses of building roads into the interior, establishing ports of entry, and it is an unwise administration indeed that will keep piling up this money in the vaults at Washington when it would be of such great benefit to the whole Territory and the thousands of miners who contemplate going in and opening up a great section of country that has never felt the tread of the white man's foot.

## Why Men Fail.

Few men come up to their highest measure of success. Some fail through timidity, or lack of nerve. They are unwilling to take the risks incident to life, and fail through fear in venturing on ordinary duties. They lack pluck. Others fail through imprudence, lack of discretion, care or sound judgment. They overestimate the future, and build air castles, and venture beyond their depth, and fail and fall. Others, again, fail through lack of application and perseverance. They begin with good resolves, but soon get tired of that, and want a change, thinking they can do much better at something else. Thus they fritter life away, and succeed at nothing. Others waste time and money, and fail for want of economy. Many fail through ruinous habits; tobacco, whisky, and beer spoil them for business, drive their best customers from them, and scatter their prospects of success. Some fail for want of brains, education, and fitness for their calling; they lack a knowledge of human nature and of the motives that actuate men. They have not qualified themselves for their occupation by practical education.—*School Supplement.*

## On Toilet Soaps and Towels in Hotels and Other Public Places.

Despite the vast improvements in the management of American hotels, there are still many defects and drawbacks which, though they may seem of practical insignificance, are in reality of deep importance to the public. Chief among these may be mentioned the toilet soap furnished the patrons in their bed rooms and baths, and the temporary guests in the wash rooms. As a general rule, it may be said that no American hotel uses even decent soap. The writer has had a wide experience among the great establishments of New York, and in only two has found a toilet soap that was really of superior quality. Many proprietors purchase cheap Castile and poor cotton seed oil soap by the hundred bars, and cut these into convenient cakes. They cleanse well and generally are free from coarse perfumes and poisonous coloring matters. But nearly all brands of this class are poorly made and strongly alkaline. They not only attack the skin and eventually produce sores, but they also irritate the mouths of the pores and eat into the glands and the oil they contain. Their use gives a clean skin, but one that is dry, rough and inelastic. Frequently, after a few days, dried white patches rise and fall off, the lips and nostrils chafe, and a general feeling of uneasiness and even positive discomfort results. Worse than these are the cheap and nasty toilet soaps so much in vogue. They are made from rancid vegetable oils and half-decomposed acid animal fats with impure alkalies, in the shortest time and the cheapest manner possible. To cover up their foulness or poor workmanship, the manufacturer colors them with brilliant dyes or very dark dyes, and with the rankest essential oils the market affords. A cake taken from a second-rate Broadway house is a good case in point. It has a neat oval form, a strong but pleasant odor, lathers freely, and is of a handsome rich brown hue. To any but an expert it would appear a superior article, while to a hotel proprietor it offers, besides all these attractive qualities, the far more fascinating element of extreme cheapness. Careful examination and analysis show that the brown color conceals a slovenly workmanship which would otherwise be exposed, in irregular masses of varying shade and consistency, and that the strong essential oils serve to smother a rank smell of putrefaction and nauseating raw materials. The amount of the oils is so large as to act as a rubefacient and even an irritant upon the skin. The writer once experimentally rubbed it on his face and allowed the thin saponaceous film to remain ten minutes before washing it off. On its disappearance he found the cuticle covered by numerous red points intermediate in appearance between acne and eczema, which lasted twenty-four hours before the face resumed its natural appearance. Such toilet soap applied to women of fine complexions, but of sensitive skins, would ruin their appearance in less than a fortnight, and would, in the long run, produce a condition of the cuticle which would require weeks of medical treatment to restore to its pristine state. Far worse would be its use upon babies and young children. Their skin is finer and more delicate than can be easily described. Irritated by such soaps, it would break out into painful eruptions, and in a short while thereafter into running sores.

The evils described apply chiefly to the bed room and bath room. Those of the public wash room are far worse. Here a larger cake is employed, and almost invariably one whose workmanship is so inferior that with the slightest use it becomes pulpy or sticky. In this condition it does all the harm mentioned, and besides this it may act, and frequently does act, as a vehicle for disease virus and disease germs. A person suffering from a skin complaint or from some blood disease which manifests itself in cutaneous disorders, ulcers, or other sores, uses the cake, and by the mere friction of rubbing, loosens scales and pieces of diseased matter which are retained by the glutinous surface of the soap. These may or may not contain the virus or the germs referred to. If they do, the next person who uses that cake runs a serious risk of absorbing the contagion and becoming a sufferer from the same disease. So bad are matters in this regard that the only safe rule for a person solicitous for his health is to never use the soaps supplied by hotels for patrons and guests, but to always carry his own with him, or to try a fresh cake, no matter how great the temptation may be to use that which is freely offered him in places of public resort.

More objectionable yet are the unwieldy roller towel, the saloon towels, and the long and broad towels of the wash room. These under any and all circumstances are a disgrace to the house that uses them and an insult to its customers. The towel removes moisture from the face and hands by rubbing. The friction does more, however, than remove moisture. It forces off scales, pieces of dead skin, lymph from cuts and abrasions, mucus from the nostrils, perspiration from the pores, pus from sores and ulcers, and anything liquid that may be excreted from the body or may have been thrown upon the surface. The fibrous and interlaced structure of the towel makes it a marvelous receptacle and catch-all for these varied substances. They remain

in its interstices until it is washed, and even long after, unless it is thoroughly boiled and rubbed with strong laundry soap or treated with javelle water or chloride of lime. It is all very well for the first man who applies a towel of the class mentioned to his face and hands. The second man runs the risk, and the risk increases arithmetically with each user. As nearly one man in fifty suffers from some contagious or germ disease, and as these hotel and saloon towels average 200 users a day, it is clear that every one toward the end of its daily career is in all probabilities a source of danger and disease. It is better to go with a dirty face and soiled hands than to use such apologies for decency. It is a thousand times better for proprietors to supply unlimited small linen or cotton napkins, which once used are consigned to the laundry, or the inexpensive Japanese paper cloths, which once employed are thrown away into the ash barrel.—*Amer. Analyst.*

## The Marriage of Flowers.

The flowers that bloom in the fall are now to be found at the fall exhibition of the New York Horticultural Society. Three long tables were covered with cut chrysanthemums of rare and radiant design and color.

To appreciate properly the exhibition, however, the services of John Thorpe will be necessary. John Thorpe is a somewhat tall and very valuable chrysanthemum whose trunk is of brown diagonal, with a calyx of brown beard under his chin and a corolla of shrewd and rugged features which light up with interest when he discusses his favorite pursuit. He is the secretary of the society, and lives at New Rochelle. When John Thorpe sits down in the shadow of a date palm, with two chrysanthemums about to be married in his hands, he becomes singularly interesting. Of the two chrysanthemums, the bride is arrayed in spotless white and the bridegroom in a brilliant vestment of red.

"The marriage of two flowers," says Mr. Thorpe, in a semi-poetic but entirely practical way, "is exactly like any other marriage. Most of the flowers on exhibition here are composite varieties, but in the simple varieties the male and female flowers are easily and instantly distinguished by a practical eye. The development of chrysanthemums is nothing more nor less than the breeding of them, and exactly like the breeding of fine varieties of stock. Five years ago we had nothing but simple flowers. Now you see the wonderful variety of shapes and sizes and colors which has resulted. This has come from hybridization, and that is done in this way."

Cutting off the long petals of one of the flowers, he showed at the base of each the pollen which had ripened and was ready to be scattered by the air in the shape of an impalpable powder. Cutting away the petals of the other, he brought to view a multitude of fine stamens, slightly sticky. Whenever the pollen powder touches any of these sticky points, a floral union takes place, and the flower grown from the resultant seed partakes of the characteristics of the two which went to form it.

"In growing the flowers," Mr. Thorpe continued, "we take a fine camel's hair brush, and with it transfer the pollen from one flower to the other. This process, in nature, is fulfilled by the air, by insects, and in various ways. There are some flowers which are fertilized only at night by moths. There are others which are wedded only in the day by the butterflies and the humming birds. When you think of moths and butterflies and humming birds reading marriage services over the flowers in a garden, there is quite an opportunity for poetry in flower culture. The arrangement is sometimes very wonderful," he said, taking a quaint and grotesque orchid in greens and browns. "This flower is self-generating, and the fertilization is carried on by the ants. The ant can get into this flower only by going over the pollen cells, and the pollen clings to him. He can get out only by passing over those places which the pollen needs to touch, and for the new flowers the ant alone is to be thanked. The same way of developing flowers can be applied to any variety. You could breed roses, for instance. The value of the chrysanthemum, however, is that you get your new results in a year, where, with roses, equally satisfactory results would require five years. The New York society has gone beyond the Japanese flowers. There is a stand of them, direct importations, over there. You can see, however, that in color, size, and design they do not compare, though it used to be said, and is still said, that the Japanese chrysanthemums beat the world. Yes. The flowers will be all the rage for a time now. The streets and the theaters will be full of them."—*New York Times.*

THE INTERMARRIAGE OF COUSINS.—The Legislature of Illinois has passed a law making the intermarriage of cousins a penal offense. This is an unwise law, first because it interferes unduly with personal rights, and next because it is not called for. The marriage of cousins who are each of healthy family and physique, and especially if they are of different temperaments, is quite free from danger.—*Med. Record.*

**Quicksilver Ores.**

Speaking on the character of quicksilver deposits, Prof. S. B. Christie, of the University of California, in his testimony in a recent case in San Francisco, said:

Quicksilver deposits, as a general rule, are very different from those of the ores of other metals. Many other metals occur in well-defined fissure veins, so that there is no difficulty in following the ore, and in many cases of calculating beforehand the amount of ore in sight; but with the exception of the deposit at the old Almaden in Spain, and to some extent the deposit at the Idria in Austria, the quicksilver deposits, particularly those of California, are characterized by a great and persistent irregularity, so that it makes the mining of those ores much more difficult than that of other metals. New Almaden is a striking example of this irregularity. It has often occurred in the history of the mine that there was none or scarcely any ore in sight, and it has often looked as though the mines must of necessity be shut down, and it has only been by the most careful and painstaking prospecting or dead work that it has been possible to keep up the production of the mine. Very frequently large bodies of ore will almost completely run out, and there will be visible in the fall of the works only a slight coloration in the vein matter, which indicates that there is ore left in that particular place, and by following out this little spring of ore carefully it may lead into a large deposit. As a result of this, the workings of the mine are necessarily very irregular, and it requires the greatest skill on the part of the engineer in charge of the works to keep up a regular and steady output of ore.

**IMPROVED CUTTER GRINDER.**

We illustrate a machine exhibited by Messrs. Hulse & Co., of Salford, at the Newcastle exhibition, and shown in *Engineering*. It is intended for grinding to a cutting edge the teeth of face or edge milling cutters up to 6 inches in diameter and 9 inches in length. Emery wheels are used for grinding the cutters, the face and not the edge being employed, so that wheels of a comparatively large diameter may be employed. Besides ordinary milling cutters, parallel or tapered reamers can be finished at this machine, which will also cut straight or spiral grooves. As will be seen on the engraving, besides the emery wheel for the special work, another for ordinary grinding purposes is attached to the machine, with an adjustable rest for carrying the work.

**Manna, the Heavenly Bread.**

Mr. Cole, of Bitlis, a missionary of the American Board, in Eastern Turkey, in describing a journey from Harpoot to Bitlis, says:

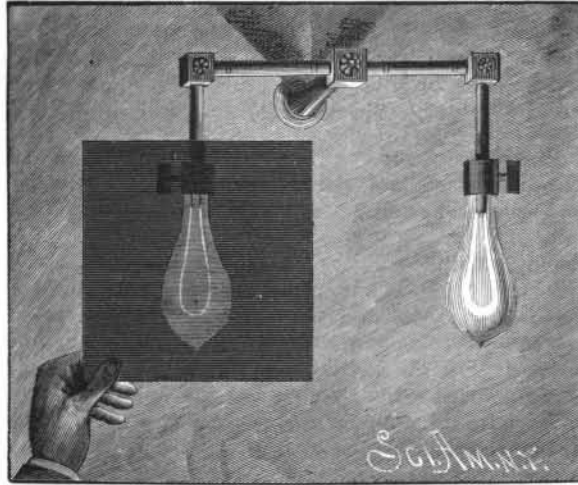
"We traveled for four days through a region where had newly fallen a remarkable deposit of heavenly bread, as the natives sometimes call it—manna. There were extensive forests of scrubby oaks, and most of the deposit was on the leaves. Thousands of the poor peasants, men, women, and children, were out upon the plains gathering the sweet substance. Some of them plunge into kettles of boiling water the newly cut branches of the oaks, which washes off the deposit until the water becomes so sweet as to remind the Yankee of a veritable sugaring off in the old Granite State as he takes sips of it. Other companies of natives may be seen vigorously beating with sticks the branches, that, from having been spread on the ground, have so dried that the glistening crystals fall readily upon the carpet spread to receive them. The crystals are separated from the pieces of leaves by a sieve, and then the manna is pressed into cakes for use. The manna is in great demand among these Oriental Christians. As we were traveling through a rather dry region, the article came in play for our plain repasts."

THE falling off in the catch of shad in the Connecticut River is very great every year. It is most marked, however, in the Thames River. Formerly the fishermen would sometimes take 2,000 shad at a haul. It has decreased in a few years, so that now the total catch reported for the last two years has been but 45 and 27 respectively.

**IRRADIATION.**

BY GEO. M. HOPKINS.

Brilliantly illuminated white surfaces and self-luminous bodies, when emitting white light, appear to the eye much larger than they really are. In nature examples of this phenomenon are presented by the sun, moon, and stars. The sun, viewed with the naked eye, appears very much larger than when the light is modi-



AN EXAMPLE OF IRRADIATION.

fied by a smoked glass. The crescent of the moon appears to project beyond the moon's periphery; and the stars, which are mere points of light even when viewed through the largest telescope, appear to the eye to have a disk of some size.

This phenomenon—known as irradiation—is due to the stimulation or sympathetic action of the nerves of the retina adjoining those which actually receive the image.

The ends of pieces of iron heated to incandescence by the blacksmith for welding seem to be unduly enlarged—an appearance due to irradiation.

Without doubt the most striking illustrations of irradiation are to be found in electric illumination. The

electric arc, which is no larger than a pea, appears to the eye as large as a walnut; and the filament of an incandescent lamp, which is scarcely as large as a horse-hair, appears as large as a small lead pencil. In viewing an ordinary incandescent lamp, it is difficult to believe that the delicate filament is not in some way immensely enlarged by the electric current or by the heat, but the experiment illustrated by the engraving shows that the size of the filament is unchanged, and proves that the effect is produced in the eye.

The experiment consists merely in holding a smoked or darkly colored glass between the eye and the lamp. The glass cuts off a large percentage of the light, and enables the eye to see the filament as it really is.

The effects of irradiation are different in different persons, and they are not always the same in the same person.

**Painting on Cement.**

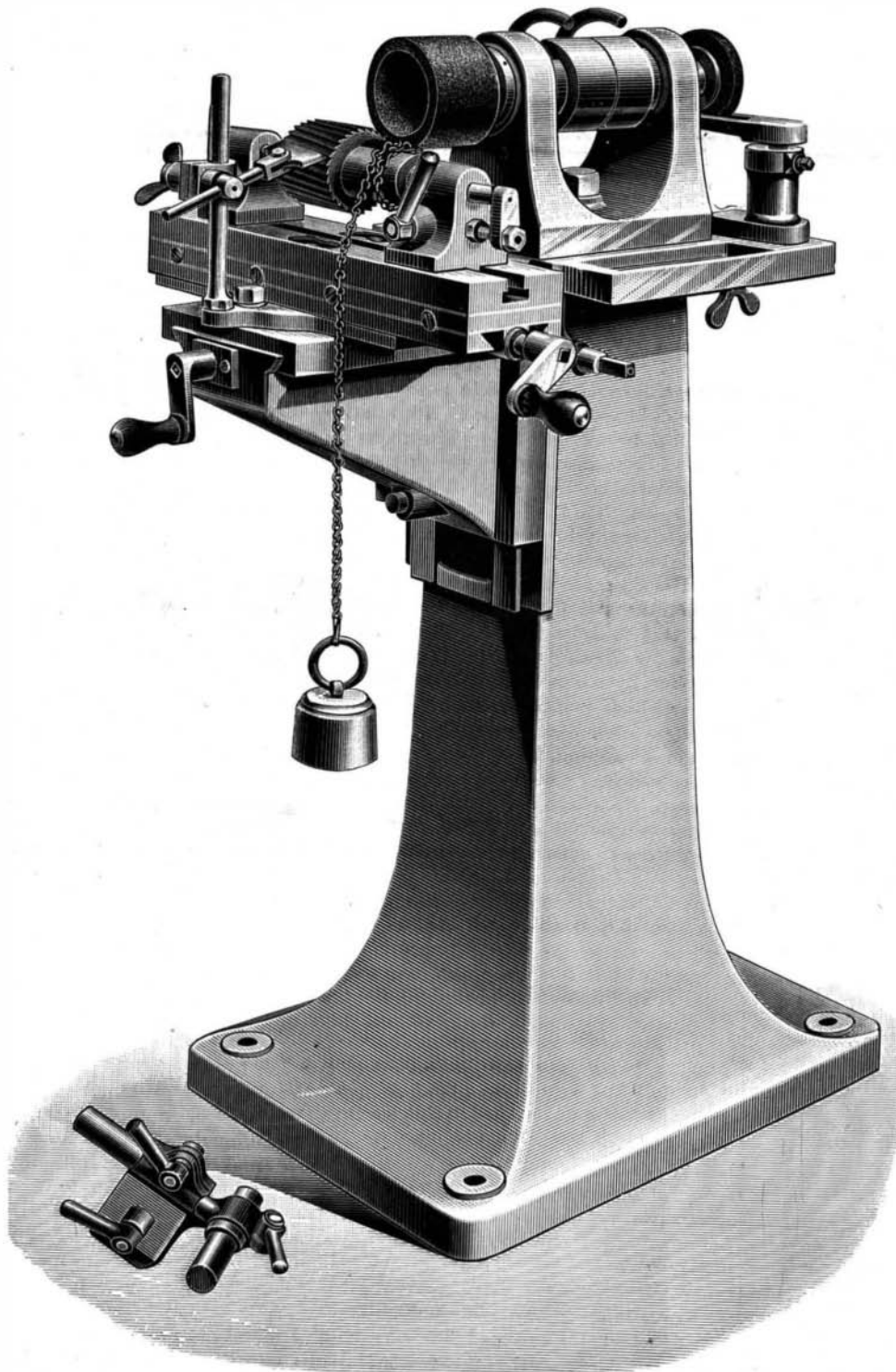
According to the *Bulletin de la Ceramique*, it is known that the caustic lime which is not in a state of combination in cement saponifies the oil used in painting. Consequently, painting on cement is only practicable when, under the influence of the air, carbonic acid has united with the caustic lime to form carbonate of lime. When it is desired to paint cement without delay, attempts are sometimes made to neutralize the lime by acids; but the above named journal recommends in preference the use of carbonate of ammonia, the acid of which combines with the lime while the acid is liberated. The effect produced is, however, only superficial. Various other expedients are referred to, but the solution of the problem would seem to consist in the use of caseine. Fresh white cheese and slaked fat lime are added to the color. This mixture hardens rapidly, assumes the consistency of stone, and is insoluble in water, a formation of albuminate of lime taking place. It is according to this system that the mural paintings at the Berlin War Museum were executed.

To make the composition, three parts of cheese and one of slaked fat lime are stirred, the quantity of color to be added being regulated by practice. Only earth colors or oxides of iron would be used for light red to dark brown shades; for blue, ultramarine or cobalt blue would be used; for white, oxide of zinc or sulphate of baryta; and for black, animal black. Inorganic colors, such as those of aniline, would not be used, nor would Prussian blue, vermilion, blue ocher, and white lead be employed, on account of the injurious effects of the sulphur present in the cheese in combination with these substances.

If the painting surface is too dry, it can easily be damped. The caseous lime should be prepared daily, and the brushes should be cleaned after the application of each coat of paint. The process thus described is recommended for its economy, the walls of a house being painted as fast as the scaffolding is removed. The caseous paint does not easily take fire, and is, therefore, considered particularly suitable for the decoration of theaters and for application to stage carpenter's work generally.

**Photographic Printing Board.**

J. Stern, of Munich, has invented a new form of printing board, which tends to do away with the heavy and expensive printing presses now employed to obtain paper positives. This instrument is composed of a wooden board, being hinged into two pieces, which has been covered with some soft material—as, for instance, with felt—and against which a glass plate, placed over the sensitized paper, is pressed by means of metal springs or levers. To each corner of the board is attached one of these levers, each of which consists of two arms of different length. The shorter arm presses against the glass plate, while the longer one can be turned and bent by pushing it down to the pin. By reason of the considerable difference of the two arms, a great pressure is exercised on the glass plate, so that the negative and the sensitized paper will be kept tightly in position during the printing process. The idea, though not a quite new one, is well carried out, and the apparatus is likely to prove practically useful.



IMPROVED CUTTER GRINDER.]