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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

SANTOS-DUMONT AND THE EXPOSITION AUTHORITIES.

It is a pity that so soon after the opening of the St. Louis Exposition, so disagreeable an incident should have occurred as that attending the act of vandalism which has put M. Santos-Dumont's airship out of commission. The announcement about the airship was quickly followed by the offer of a reward of $1,000 by the St. Louis officials, for the apprehension of the miscreant who committed the deed. This certainly was a step in the right direction, and indicated the purpose and intention of the authorities to protect exhibitors and competitors who have made entries at the Exposition. This was followed, however, by a disagreeable surprise in the extraordinary report rendered by the Chief of Police, accusing Santos-Dumont of himself having committed the outrage. This is certainly adding insult to injury. Santos-Dumont is no mere showman. He is a Brazilian gentleman, who from early youth has been the victim of a passion for aeronautics. He has spent a large private fortune in indulging this taste. He has built, launched, and successfully operated some dozen aerial vessels of various types. His success in the field of aeronautics has been pronounced, and has brought to him much recognition from French and other aeronautical societies. It will be remembered that he was the successful competitor for the Deutsch prize of 100,000 francs, having sailed successfully around the Eiffel Tower and back to the point of departure. Santos-Dumont has been before the public eye in France and this country for many years. To accuse him of committing a crime such as that imputed to him, on the flimsy evidence which up to date has been placed before the public by the Chief of Police at St. Louis, would seem unworthy of serious consideration, were it not that it were placing not only doubt, but stigma, on the name of one to whom those interested in aeronautics are greatly indebted. There is every reason to believe that Santos-Dumont is considered as the most formidable competitor for the great prize of $100,000, offered by the St. Louis Exposition officials. Does it stand to reason that after he had spent many thousands of dollars in constructing the "Santos-Dumont No. 7" for the special purpose of competing for this prize, that he would deliberately commit hari-kiri? The two main accusations brought against Santos-Dumont by the Chief of Police are: First, that he brought the airship to St. Louis for exhibition purposes, and not for purposes of competition; secondly, that he has lost courage, owing to the many accidents during past years in experiments made about Paris, and he was endeavoring to escape the dangers attendant upon the competition. With regard to the first charge, it may be stated that Santos-Dumont is no charlatan, and that it is a well-known fact that he has sunk a large fortune in his aeronautical experiments. At the time that he won the Deutsch prize, it was said that he distributed the large sum of money he received among the poor of Paris.

The reflection upon his courage can not be taken very seriously. His many repeated feats of daring and his long record of successful experiments stand as sufficient refutation of an accusation which seems as unworthy as it is discourteous. The incident will no doubt produce as disagreeable an impression among those who are interested in fair play in France as in this country.

Should any serious delay follow the repairing of the injury to the airship, the authorities, it would seem, should surely afford this visitor at the Fair an opportunity of making good the harm done, and of entering the competition under as favorable conditions as before the disagreeable incident occurred.

MACHINE GRINDING.

Any one who has ever stood by the side of an iron-planing machine or lathe and watched it slowly slugging off, or what is worse, perhaps, if the job is a hurried one, see it tediously skimming the surface for a finishing cut, must have wished that there was either another way of doing the work, or that the machine could be speeded up to get along a little faster, no matter whether he was pecuniarily interested or not. It seems a great waste of time to do so little; other people think so too, and reduce the amount of stock to be removed to its lowest terms, which does not expedite the work in the least. It takes just as long, so far as the speed of the tool is concerned, to remove a sixty-fourth of an inch as it does to remove a quarter of an inch; quicker feed can be used on the finishing cut, certainly, but the loss of time is in the type of tool employed on the work. Matters have been expedited somewhat by the introduction of new tool steels of late, but there are some drawbacks to the use of them upon the equipment of machine shops generally, the old tools not having power enough to take the cuts that the steel will stand; if it is necessary to get a new outfit of machine tools to use a better steel, old shops will be handicapped for some time to come. The milling machine is the alternative of the planing machine on regular work, but it can not compete with the latter for jobs of all sorts that come to machine shops usually, and the cutters lock up a good deal of money. It comes to this, then, that we must subdue our enthusiasm and stick to the standard machines, or take a chance with still another agent, and that is the grinding machine, which has undoubtedly a future before it. Recent improvements in the capacity and range of the grinder render it available for both large and small work in manufacturing and repair work as well, from chilled rolls 12 inches in diameter down to a quarter-inch rod. If proper precautions in the management of the grinder be taken there is no tool that can compare with it in truth of surfaces, and persons who are skeptical as to this fact may quickly satisfy them by turning a shaft in a lathe, smoking it in any way, and then putting the shaft in a grinding machine; the irregularities left by the lathe tool show in a most surprising manner. The first grinding machine was undoubtedly a grindstone, and even that is no mean adjunct now to finishing metals in the hands of skilled workmen. I have seen gun barrels "turned" on grindstones by merely screwing a dog on one end by which to handle them—which would caliper remarkably well as to rotundity and size. Cutlery never sees any other tool than grinding machines of one sort or another. As regards accuracy of surface and dimensions the machine grinder will do splendid work in the hands of those who know how to run it. Rolls for certain purposes have to be as nearly perfect as human hands can make them, and it is wholly within possibility to grind a pair of rolls, superpose them with slips of the thinnest tissue paper between and have the rolls "bite" them everywhere; not one can be withdrawn without breaking it. This comes pretty near absolute accuracy. But grinding machines have peculiarities of action which it is necessary to know before undertaking their use. Abrasion causes heat; if this is even sensible heat, perceptible to the touch, there will be a change of dimension in the work caused by expansion in different parts. On the start the shaft, or whatever the job may be, is cold, but as the emery wheel traverses the heat increases and the shaft gets larger, so that by the time the surface is finished there are various dimensions when the metal is cool again.

A great variety of work can be done on the grinding machines already in market, but for the average small machine shop all over the country the cost of these tools is prohibitive. They are finely fitted up with every appliance for adjustment at certain angles and for plane and parallel work besides; but certain specific classes of work can be done by very simple machines. Take the case of lathe handles, for instance. The whole of the surface on them can be skinned over, so to speak, from the drop-forging by an emery wheel, the machine to which it is attached having formers conveniently fastened to the carriage, so that ordinarily intelligent boys or handy men can run them. Aside from this detail, which is only mentioned as an example, there are quantities of other jobs, particularly in mechanics' and carpenters' tool shops, which can be executed on a simple tool which could be sold at a low price.

Joseph Horner, an English mechanical engineer and tool-maker, has paid much attention to the grinding machine, and gives some points in Engineering which are worth noting. An objection to the method itself has been made by some who urge that the natural wear of an emery wheel would militate against accuracy of dimension, but Mr. Horner says, on this head, that mistaken notions exist as to the amount of wear of wheels. Under certain conditions wheels will show wear during long roughing cuts; this will happen if the work is speeded too high and the wheel is forced too hard. It will also occur if the wheel is too soft, but with proper management these things should not be allowed. A wheel should not show wear even in a long roughing cut and none whatever in a finishing cut. The wear is controllable to such an extent that it should not be noticeable in doing a large number of pieces of the same kind. One surface speed should not be used upon all kinds of work. Neither is one kind of wheel suitable for all classes of jobs at different speeds; this can be done, but it is not wise to undertake to cut iron, steel, and brass on the same wheel, for the time spent in changing wheels is more than made up by the better work done when the whee' is suited to the task in hand. Even on the same material the wheel may need to be hard or soft according to the character of the work to be done, either slow or fast cutting as exigencies may demand, and, in some cases, depending upon whether the machine itself is light or heavy; uniform speeds are not adhered to any more than on lathe work. Specifically the speed of the work should not exceed in revolutions from 10 to 40 feet per minute; 100 feet and over is too fast. The grinding machine is in its unappreciated stage, and has yet to obtain its proper place in machine shops.

It is asserted by a manufacturer of emery wheels that it is possible to remove one cubic inch of steel per minute from cylindrical work with proper wheels, and this is by no means the limit of capacity. The Brown & Sharpe Company illustrate the difference between turning in a lathe and grinding with an emery wheel by the fact that in the latter there are, approximately, 2,500,000 cutting points on a wheel 18 inches diameter by ¾ inch face which pass over from 1 to 4 square feet of surface per minute, while a lathe has but one cutting tool at less speed superficially in a given time.

The practice at present is to rough-turn shafts before grinding them, the allowance for the latter operation being a full sixty-fourth of one inch; sometimes a finishing cut is taken in the lathe, but this is a waste of time and does not give so good results, because the temperature is less likely to rise on a rough surface than upon a smooth one. Rough-turning work for a grinding machine should be done with coarse feed, the coarser the better, within reason, for under these conditions the grinder does its best work. The important point is to rough-turn liberally, and grind lightly, never the reverse of these processes.

THE PROGRESS OF MOSQUITO EXTERMINATION.

It having been demonstrated by many physicians and scientific men that certain species of mosquitoes facilitate the transmission of malaria and fevers from affected communities to those not affected, it follows that the only remedy is to prevent the production of the pest. The method most effective is the drainage of swamps or meadows to avoid standing pools of water; the results obtained in this way have been highly encouraging. Many desirable towns, presenting most attractive locations for residences, have acquired such reputation for having malaria and mosquitos that their development has been greatly retarded. It is to show how easily and with what small comparative expense these depressing conditions can be reversed and improved, that the National Mosquito Extermination Society was organized in this city last winter. The report of the society has recently been published, and contains many useful suggestions as to the best methods to be pursued to prevent the breeding of the mosquito. The society is desirous of enlisting in its membership all persons interested in promoting the general subject, and wishes to secure information from all parts of the country, later to be published in its annual report. As previously remarked, one of the most extensive plans for ridding a locality of mosquitoes is by a thorough drainage of meadows or swamps.

This is now recommended for the great meadows lying east of the city of Newark, N. J., covering a tract about eighteen miles long by four miles wide, or about 27,000 acres. The New Jersey State Geologist and two of his scientific associates have made a report urging the draining and filling of the Newark meadows as the only means of ridding the regions of the mosquito pest.

The report states that the agricultural value of the lands to be redeemed and cultivated would ultimately repay the cost. But the good effect on the surrounding cities and suburban towns in preventing the spread of malaria, thereby promoting the public health, is a greater reason why public aid should be demanded in co-operation with private enterprise or subscription for the prosecution of the work.

Work will have to be begun, no doubt, as that on Long Island was, at the expense of public-spirited citizens who are willing to risk money to prove in a practical way the extermination of the mosquito. It requires co-operation from so many sources that all that private citizens can do by organization and all that the cities can be induced to do in the way of appropriation will need to be combined in order to work on a territory large enough to make the demonstration convincing. It will be an excellent plan for village or town improvement associations in mosquito localities to discuss in public meetings the necessity of eliminating the mosquito pest, urging co-operation with adjoining localities, and show by maps and plans what can be done to secure permanent and lasting improvement. Ultimately, city and State aid can be secured to

assist the work, much on the same plan as State aid is now given in road building.

That the importance of the mosquito is truly understood as regards its relation to the public health in the Panama Canal territory is shown by the appointment of Dr. William C. Gorgas, Assistant Surgeon-General, U. S. A., who has instructions to provide drainage for swamps and all mosquito-breeding places in that district. He is now in Panama for that purpose.

The board of health of the village of Lyons, N. Y., has recently adopted a new rule, requiring that all open barrels, casks, or cisterns containing water shall be covered with mosquito netting, to prevent the escape of any mosquitoes breeding on the surface.

Under the right conditions it is astonishing what a large quantity of mosquitoes will develop and breed from a small amount of water.

There are localities under our own observation which have been free from mosquitoes for six years past, which for many years were unbearable to live in in hot weather, all due to the elimination of stagnant pools by simple drainage.

The extermination of the mosquito is a question of growing importance, and we hope will receive general attention among the various States and Territories of this country. The remarkable progress made in Havana, Cuba, in this direction in the prevention of yellow fever by protection from mosquitoes is a notable example of improvement resulting from hygienic scientific investigation.

A VEGETABLE BUTTER.

Our delicious table butter made supposedly from the cream obtained from cow's or goat's milk, besides having a dangerous competitor in oleomargarine, is menaced anew by a substitute no less formidable in character; this is an exotic product—the butter, in fact, extracted from the meat of the cocoanut. This must not be confounded with cacao butter, which, though sounding very similar to cocoa butter, is nevertheless prepared from an entirely different nut and used for quite other purposes.

The cocoanut tree, that most providential growth of the tropics, produces, without cultivation, a nut with which we are all familiar. Contained within its hair-covered and ovoid shell is a most delicious milk, a cooling draft which quenches the thirst of the way-worn and jaded traveler and refreshes the tired laborer. Science has made the important discovery, too, that its meat, of which there is always a generous supply, when dried and pressed furnishes a whitish substance which solidifies at 20 deg. C., but above this temperature runs into a yellow and translucid oil. The annual importations of cocoa-oils coming from India and Africa are considerable. The better grades are drawn from Cochin China, the island of Ceylon, from Australia, and from Karri-Kall, well down near the end of the Kara peninsula. These various commercial grades are obtained by pressing—first cold, then warm—the pulp extracted from the nut which has been previously divested of its shell.

This nut produces 60 per cent of oil, and the cocoanuts collected upon a hectare of land (a fraction over 2 acres) planted to these trees will yield an annual production of 800 kilogrammes of oil which readily oxidizes or becomes rancid, recalling, by its taste, the fruit from which it is derived. Till now this oil has had no other industrial use than furnishing the fats for soap or oil for the lubrication of machinery, the better sorts being employed in the preparation of textiles.

Under the name of "copra" the meat of this cocoanut comes to our shores and is here employed in the manufacture of this industrial oil, the residuum, in the form of a press cake, being fed to cattle to fatten them. According to a French publication, it is in France that this cocoanut oil is subjected to special treatment, from which it emerges to become the formidable rival above indicated of our cherished butter made from cow's milk.

A German chemist of prominence, Dr. Heuner, proposes to buy up all the cocoanut oils and to transform them into a succulent, savory, inodorous product which is soluble in ether and possesses no acid reaction; to this product he announces his intention of giving the name "vegetable butter."

Of all the vegetable oils, that extracted from the cocoanut is the one of which the composition approaches more nearly to the butter made from milk.

Like true butter, it contains 7 per cent of soluble acids, which are not found in such considerable proportion in any other fat. These are butyric acid, capric or decylic acid, which give to our table butter its pleasant aroma and a very pronounced taste of the hazelnut.

Moreover, cocoa butter contains from 25 to 30 times less water than true butter. It will keep 15 or 20 days without showing any acid reaction, and from this fact seems to offer a real superiority over animal butter for use in the preparations of dry pastry, biscuits, and such like.

The process advocated by Dr. Heuner for the treatment of cocoanut oils and from them thereby to obtain a butter in every way adapted for food is that which Dr. Schlink has already put into practice. It consists simply in relieving these oils of their fatty, volatile, and odorous acids, as well as of their other aromatic principles, by means of alcohol and bone-black. After this treatment the product obtained has the appearance of a whitish mass of the consistency of ordinary butter, possessing a sweet savor; it melts at 25 deg. C. and shows the following component parts:

Fatty matter	99.632 per cent
Mineral matter	0.011 per cent
Water	0.357 per cent

The price of cocoa butter, we are informed, is about 1 franc 60 centimes a kilogramme, something over two pounds, and is much lower than that of butter made from cream; moreover, since it contains little or no water, less of it would be required by weight, and, because of its slowness of oxidizing, confectioners and bakers would find it to their advantage to use it for cakes, pies, and other things in their lines, because they would not get stale and unmarketable so quickly.

From the standpoint of hygiene it may be well to remember that butter made from milk occupies the first rank among substances which are most favorable to the culture of microbes and of the worst ferments, while cocoa butter, on the contrary, seems to be an antiseptic medium very improperly qualified for the dissemination and propagation of bacteria. In this respect, comparative experiments made upon both of these substances have given results which do not admit of doubt as to which is the better antiseptic.

Finally, experiments upon the artificial digestion of this form of butter, carried out in the Central Hospital of Vienna, have given equally gratifying results and been confirmed later by other experiments in the different hospitals of Switzerland.

While it has not yet been satisfactorily demonstrated that cocoanut oil can furnish a butter capable of supplanting the delicious products of the dairies of Isigny and Brittany, it is, however, significant that the various boards of health have not raised their veto against the human consumption of this new product; which, let us hope, will not lend itself, like oleomargarine, to the fraudulent adulterations which defy the keen understanding of the chemist.—Translated from Science, Arts, Nature.

HISTORIC FOREST FIRES.

When all the conditions are favorable, forest fires sometimes reach gigantic proportions. A few such fires have attained historic importance. One of these is the Miramichi fire of 1825. It began its greatest destruction about 1 o'clock in the afternoon of October 7 at a place about 60 miles above the town of Newcastle, on the Miramichi River in New Brunswick. Before 10 o'clock at night it was 20 miles below Newcastle. In nine hours it had destroyed a belt of forest 80 miles long and 25 miles wide. Over more than two and a half million acres almost every living thing was killed. Even the fish were afterward found dead in heaps along the river banks. Five hundred and ninety buildings were burned, and a number of towns, including Newcastle, Chatham, and Douglastown, were destroyed. One hundred and sixty persons perished, and nearly a thousand head of stock. The loss from the Miramichi fire is estimated at $300,000, not including the value of the timber.

In the majority of such forest fires as this the destruction of the timber is a more serious loss by far than that of the cattle and buildings, for it carries with it the impoverishment of a whole region for tens or even hundreds of years afterward. The loss of the stumpage value of the timber at the time of the fire is but a small part of the damage to the neighborhood. The wages that would have been earned in lumbering, added to the value of the produce that would have been purchased to supply the lumber camps and the taxes that would have been devoted to roads and other public improvements, furnish a much truer measure of how much, sooner or later, it costs a region when its forests are destroyed by fire.

The Peshtigo fire of October, 1871, was still more severe than the Miramichi. It covered an area of over 2,000 square miles in Wisconsin, and involved a loss in timber and other property of many millions of dollars. Between 1,200 and 1,500 persons perished, including nearly half the population of Peshtigo, at that time a town of 2,000 inhabitants. Other fires of about the same time were most destructive in Michigan. A strip about 40 miles wide and 180 miles long, extending across the central part of the State from Lake Michigan to Lake Huron, was devastated. The estimated loss in timber was about 4,000,000,000 feet board measure, and in money over $10,000,000. Several hundred persons perished.

In the early part of September, 1881, great fires covered more than 1,800 square miles in various parts of Michigan. The estimated loss in property, in addition to many hundred thousand acres of valuable timber, was more than $2,300,000. Over 5,000 persons were made destitute, and the number of lives lost is variously estimated at from 150 to 500.

The most destructive fire of more recent years was that which started near Hinckley, Minn., September 1, 1894. While the area burned over was less than in some other great fires, the loss of life and property was very heavy. Hinckley and six other towns were destroyed, about 500 lives were lost, more than 2,000 persons were left destitute, and the estimated loss in property of various kinds was $25,000,000. Except for the heroic conduct of locomotive engineers and other railroad men, the loss of life would have been far greater.

This fire was all the more deplorable because it was wholly unnecessary. For many days before the high wind came and drove it into uncontrollable fury, it was burning slowly close to the town of Hinckley and could have been put out.—Gifford Pinchot in Farmers' Bulletin.

SCIENCE NOTES.

It is not a pleasant thought that the brilliant white note paper which your hand rests upon may have in it the fibers from the filthy garment of some Egyptian fellah after it has passed through all the stages of decay until it is saved by a ragpicker from the gutter of an Egyptian town; and yet it is fact that hundreds of tons of Egyptian rags are exported every year into America to supply our paper mills. At Mannheim on the Rhine the American importers have their ragpicking houses where the rags are collected from all over Europe, the disease-infected Levant not excepted, and where women and children, too poor to earn a better living, work day after day, with wet sponges tied over their mouths, sorting these filthy scraps for shipment to New York. Our best papers are made of these rags and our common ones of wood pulp, which is obtained by grinding and macerating huge blocks from some of our soft-wooded forest trees.—David G. Fairchild in the National Geographic Magazine.

Major James Harrison has just returned to England after a prolonged journey through the dense forests of Central Africa, during the course of which he saw the okapi in its natural habitat. Major Harrison penetrated the Stanley Forest to the region peopled by the pygmies, in search of this animal. His efforts in this country were, however, not successful, so he directed his way to Jabir, and thence into the great forest of De Melley. This forest is particularly dense, the trees being thickly interwoven with dense creepers and tangled undergrowth; in fact, it could only be penetrated by crawling on the hands and knees, a most difficult and arduous operation. On the sixth day after he had entered this forest, his party encountered the spoor of the okapi. This was followed for several hours, when suddenly the party came upon the animal some fifteen feet in front of them. The animal was startled by their approach, and before the major could obtain his rifle from one of the natives accompanying him, the animal had darted into the thick undergrowth. The view that the hunter obtained, however, was sufficiently long to enable him to observe its general characteristics. The animal stood between ten and eleven feet in height, was of a general tawny color about its body, and was striped over the loins. The truth of Major Harrison's story is vouched for by the natives and pygmies who accompanied him on the expedition, and they say he is the first white man who has seen the animal in its native wilds.

An expedition is being organized in Great Britain for the exploration of those regions of British Northern Nigeria Protectorate situate nearest the western shore of Lake Chad. The object of the expedition is to survey and investigate thoroughly, and to gather some zoological knowledge indigenous to the country traversed. Some three months will be spent at a place called Tonga on the Gongola River, one of the northern tributaries of the Benue, which is conveniently situated for exploring the provinces of Southern Bornu and Bauchi. The expedition is equipped with two steel flat-bottomed shallow-draft boats. These have been built in sections for easy transit to Africa, and will there be reassembled. They have been provided to facilitate navigation of the shallower rivers, and will prove of great assistance in both the survey work and the collection of zoological specimens. After completing all the work that can be accomplished from the Tonga base, the expedition will move northward into the basin of the Koma-Lugu River, where a considerable area of little-known country will be mapped and explored. Proceeding down the river to Lake Chad, Kuka will be reached. Thence it is hoped that the party will be able to proceed to the German and French spheres of influence on the southern shores of the lake, and the return journey will probably be made by way of Shari and Logone Rivers, past Lake Triburi, to the Kebbi, which is a tributary of the Benue.