Correspondence.

Smokeless Powder Formula—a Correction.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of January 10 I read this chemical formula for the composition of the smokeless powder: $10\ C_3H_5(ONO_2) + 9\ C_6H_7O_2\ OH(ONO_2)_2$, forming the products, $58\ CO + 26\ CO_2 + 61\ H_2O + 48\ N$. Mol. W. = 4538. Now, I suppose there is some mistake in that.

1st. 26 CO_2 should be 26 CO_2, and then the Mol. W. will be 4538. No gas CO_3 exists I believe, but CO_2 is common.

2d. $C_3H_5(ONO_2)$ is meant, I suppose, for nitro-glycerine, which is $C_3H_5(ONO_2)_3$, or $C_3H_5(NO_3)_3$.

The other compound, $C_6H_7O_2.OH(ONO_2)_2$, may be the *binitro* cellulose, or a mixture of the three, thus: $3\ C_6H_7O_2(NO_3)_3$, trinitro cellulose; $3\ C_6H_7O_2.OH(NO_2)_2$, binitro cellulose; $3\ C_6H_7O_2(OH)_2(NO_3)$, mononitro cellulose; could be resumed in $9\ C_6H_7O_2.OH(NO_2)_2$. Therefore it seems to me that the formula should be written thus: $10\ C_3H_5(ONO_2)_3 + 9\ C_6H_7O_2.OH(ONO_2)_2$, with a Mol. W. of 4538. The decomposition products are $58\ CO + 26\ CO_2 + 61\ H_2O + 48\ N$.

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Indexing Notes and Queries.

To the Editor of the Scientific American:

In the issue for January 10, under query No. 2689, a subscriber asks how he may be able to index the "Notes and Queries." As I, too, regard them as highly valuable, it has been for some time my custom to index them. For a number of years I have been in the habit of indexing all my periodicals as well as the books which I have read, from the principle that it seems a waste of time to read, in general, what is not of permanent value and may not be wanted again for future reference.

As the method which I have employed has proved satisfactory, and is simple and cheap as well, I give it for the benefit of other readers. It is somewhat more detailed than the one suggested in the reply to the query.

Procure three-quire blank books of convenient size, with record ruling. Cut the margins for the letters of the alphabet, as in an index to a ledger. Allow six pages to each letter, with the exceptions of J and Z, for which four will be sufficient, and there will remain two each for Q and Z. Index successively these six pages with the vowels in order. This will leave one blank page for miscellaneous additions.

To use it, select the leading word in the article and find its initial letter in the margin, and the first vowel following the initial will indicate the page for entering the reference. W. M. STINE,

Prof. Physics and Chemistry, Ohio University.

Athens, Ohio.

What is the Temperature of Ice?

Authorities differ widely upon this question. A careful investigator recently made some experiments looking to a solution of this and has sent us the following:

January 23. Atmospheric temperature + 40° F.

(1) In a block of inferior ice, full of bubbles and fissures, an auger hole was bored 6 inches deep. In the cavity thus formed a chemical thermometer was dropped, the borings being used to pack the orifice around the instrument. When fifteen minutes had elapsed, the temperature within the ice was found by aid of a lens to be + 30·5°.

(2) Equal parts of ice and salt being mixed in a wooden pail, they formed a solution at the bottom, in which the thermometer read —10°. In the center of the pail a quart tin cup was placed, nearly full of filtered water. The cup was supported above the bottom of the pail, and in it was suspended a second chemical thermometer, while the water was allowed to freeze into a solid mass around it.

In thirty minutes the water in the cup was converted into ice. At the end of an hour and a half the relative temperatures indicated by the two thermometers have not varied, and now read, respectively: That in the freezing mixture, —50°; that in the ice in cup, 0°. These readings were taken in the office, where the temperature was 74°.

Both thermometers were carefully compared with a valuable standard instrument and with each other, before and after the experiments, and their readings were corrected for variation at different points.

Progress of the World's Fair.

Plans for the government buildings have been completed in Washington. The buildings, which will be nearly square, will cover nearly 150,000 square feet, and have a main entrance and ornamented arcade resembling the Arc de Triomphe at Paris. In the middle a handsome, pagoda-like tower will rise, beneath which will be a great rotunda. The building will cost $400,000, and $1,000,000 will be spent on the exhibition and in its annexes. The government buildings at the Centennial cost only $80,000.

How Newspaper Pictures are Made.

The illustration of newspapers is a new branch of art. Ever since its beginning its apprentices have been trying to find out the simplest and most effective methods for the reproductions of drawings, in order that they might be made with the greatest possible quickness, engraved on metal with the utmost attainable celerity and printed clearly and well at the rate of twenty thousand copies per hour. To such perfection have the processes for this purpose been brought, that the turning out of pictures all ready for the lightning presses is nowadays hardly more than a matter of a few minutes' time.

Most interesting of the processes employed in newspaper illustration, from the point of view of simplicity, is what may be termed the "chalk method." Take a thin bed of smooth chalk laid upon a metal surface, and draw upon it with a fine steel point any picture you may desire. The steel point will cut the lines of the picture out of the chalk to the metal, and thus you will have it in the shape of an intaglio. Make a stereotype from this intaglio, and you have your metal plate to print the picture from. Could anything be more simple?

DRAWING ON A BED OF CHALK.

Such is the idea of the chalk process. In applying it, instead of pure chalk various mixtures are used, such as plaster of Paris, which is merely chalk in another shape, with a certain proportion of a white Carolina clay. The stuff, pulverized and stirred up with water, is spread over a rectangular sheet of polished steel, as you would spread a slice of bread with butter, to an even thickness of about one thirty-second of an inch. Now you are ready to begin operations as soon as you have baked the steel plate in an oven for a while, until the chalk layer has been rendered perfectly hard.

It will hardly do for you to attempt to draw your picture directly upon the chalk, lest you make mistakes. The best way is to make your sketch on a piece of paper, and then laying it down upon the chalk surface, go over the lines with a pencil point, which will indent the paper, and leave marks beneath upon the chalk. Lift the drawing, and you find under it, in the chalk, its reproduction. Now you apply your steel point directly to the chalk, cutting all the lines of the drawing down through the chalk to the surface of the steel plate. When you finish this operation the dark steel of the plate shows through the chalk in all the lines of the sketch. And these lines are perfectly clean and sharp, thanks to the keenness of the knife-like steel point employed. All you have to do for the rest is to pour molten lead over the chalk surface in a mould and let it get cold. The lines that are cut out of chalk will be reproduced in relief upon the lead, and thus you will have your metal engraving to print the newspaper picture from, mounting it for the purpose on an iron block, thick enough to make it level with the type.

ZINC ETCHING.

Though so advantageous for its simplicity, the chalk method is not so good for fine work in the way of sketches and portraits as the "zinc process," so called. The former, however, by reason of its cheapness, is most useful to provincial newspapers, which cannot afford comparatively expensive photographic plant required by the latter. In the zinc process, to begin with, an ordinary photograph reduced to the required size is taken with a camera of the pen and ink sketch drawn on cardboard by the artist. Next a smooth plate of zinc is "flowed over" with an albumen solution that forms a sensitized skin on the surface. The glass negative of the picture is laid upon this zinc plate and the two are put together in the sunlight. What are to be the black lines of the printed drawings are, of course, white and transparent in the negative. The sunlight goes through wherever the negative is transparent, and has the effect of hardening the sensitized skin beneath, so that it clings tightly to the zinc. It requires only one minute to perform this operation. Now the zinc plate is taken and given a coating over the sensitized skin of lithographer's ink, rubbed on with a roller, after which the plate is washed. In all places where the sunlight has not struck the zinc, owing to the opacity of the glass negative, the sensitized skin readily washes off, together with the ink that covers it; elsewhere it clings. Thus, after the washing, the perfect drawing in ink remains upon the zinc plate. To make the ink lines harder the plate is brushed with powdered dragon's blood. Then it is plunged into a bath of acid, which eats away the zinc wherever it is not protected by the ink, so that when it is taken out the lines of the drawing are found all raised above the rest of the surface of the plate, like a map for the blind, and when mounted "type high" on a metal base, you have your "cut" ready to print from.

Such is the zinc process. "Processes" have infinitely multiplied within the last few years—so much so, in fact, that the student of engraving is aghast at contemplating their variety. At present, however, the zinc method seems to be the most available for journals of the period. At all events, it is employed by a majority of the big newspapers of the country.

A THIRD PROCESS

considerably used for newspaper illustration is that of photo-engraving, which somewhat resembles the zinc method. A glass plate, however, is used instead of a metal one. This glass plate is covered with a thin layer of sensitized gelatine, which is permitted to dry. Then the photographic glass negative of the drawing, made with the camera, just as in the other case, is laid over the gelatine, and the glass plate and negative, with the gelatine layer between them, are put in the sun for half an hour. The light hardens the gelatine, and makes it cling to the glass plate wherever it strikes through the negative, so that when the glass plate is subsequently put into water, all the rest of the gelatine comes off, leaving the drawing on the glass in gelatine lines. Moist plaster of Paris is spread over the plate next and permitted to harden. When it is taken off it is a mould of the drawing. From this mould a plaster "relief" is made, and a reproduction of metal in this relief by stereotyping is the plate to print with.

These are the three methods by which newspapers produce the pictures which go so far to brighten up and help out the interest of the columns of the daily press.—*Washington Star.*

The Strength and Weight of Aluminum.

The following interesting data concerning the strength and weight of aluminum are abstracted from a paper by E. Hunt, J. C. Langley and C. M. Hall, read before a meeting of the American Institute of Mining Engineers, and copied into *Fire and Water.*

Bar 1 in. square, 24 in. between supports loaded, at center with
Load of 50 pounds deflected $\frac{3}{64}$ in., permanent set, $\frac{3}{64}$ in.
Load of 150 " " $\frac{11}{64}$ " " $\frac{1}{16}$ "
Load of 200 " " $\frac{17}{64}$ " " $\frac{1}{16}$ "
Load of 300 " " $2\frac{13}{64}$ " " $2\frac{5}{64}$ " not ruptured

Taking tensile strength of aluminum in relation to its weight, it is as strong as steel at 80,000 pounds ultimate strength.

Metal.	Weight of 1 cut ft. in pounds.	Tensile strength per square inch.	Length of a bar able to support its own length.
Cast iron	444	16,500	535 feet.
Ordinary bronze	525	36,000	9,893 "
Wrought iron	480	50,000	15,000 "
Hard struck steel	490	78,000	23,040 "
Aluminum	168	26,000	23,040 "

Aluminum 97 to 99 per cent silicon (graphitic) 0·10 to one per cent silicon combined 1·90 to 2·80, and iron from 0·40 to 0·20 per cent. The averages are as follows:

Elastic limit per square inch in tension	(Castings)	= 6,500
Elastic limit tension	Sheet	= 12,000
Elastic limit tension	Wire	= 16,000
Elastic limit tension	Bars	= 14,000
Ultimate strength per square inch in tension.	(Castings)	= 15,000
Ultimate strength tension	Sheet	= 24,000
Ultimate strength tension	Wire	= 30,000
Ultimate strength tension	Bar	= 26,000
Percentage of reduction of area, in tension	Castings	= 15 p. c.
	Sheet	= 35 p. c.
	Wire	= 60 p. c.
	Bar	= 40 p. c.

The Tænicide Properties of the Cocoanut.

Professor Parisi, of Athens, some time since called attention to the tænicide properties of the cocoanut when freely ingested. His attention was drawn to the subject from an accidental experience in his own case. It was while he was traveling in Abyssinia that one day he took a considerable quantity of the nut, sufficient to produce an attack of diarrhea. After a while, much to his surprise, with one of these diarrheal motions there came away a complete tænia, head and all, and quite dead. After his return home to Athens he made some observations in this line of treatment and reported an almost invariable success. In only one instance did he fail to secure the head. His method was to order the milk and pulp of one cocoanut to be taken in the morning, fasting, no purgation or cessation from business being required. In this country Dr. Allison has reported, in the *Medical Age*, a case where the use of *Filix mas*, oil of turpentine, and chloroform had successively failed to effect a complete removal of the parasite, but in which the patient by chance partook of a cocoanut and soon after was relieved of a dead tapeworm with its head. Since then he has had occasion to prescribe cocoanut in this trouble, and has found it the pleasantest of all the tænicides, and one that does not require the administration of a cathartic.—*New York Medical Journal.*

Black Polish on Brass.

To make a dead-black polish on brass, for microscopes, etc., mix 1 ounce of nitrate of silver in a dish with 20 ounces of distilled water. In another dish mix 1 ounce of nitrate of copper with 20 ounces of distilled water. Mix the two solutions together, dip the brass in the liquid, remove the brass, and heat in an oven until the desired degree of black is obtained.