Correspondence.

A Protective Coating for Metal Wanted.

To the Editor of the Scientific American:

I have a problem that I have been trying to solve for some time, but as yet have been unable to get any advice on the subject, and thought that you might help me through the columns of your valuable paper. The problem is in regard to a covering for frames upon which are placed articles to be electro-plated. It must be an insulator to electricity and be able to stand the action of boiling caustic soda at between 15° and 20° Baume hydrometer; also must resist the action of cyanide of potassium cold.

I have thought that possibly a covering of rubber might answer the purpose, but perhaps you can suggest something better. C. A. W.

Akron, O.

[A properly made stoneware would be very slowly attacked by the liquids you mention. It might be made in the form of tubes to slip over your frame, or if in half section, some simple interlocking or dovetailing of the pieces might be provided for. Perhaps some of our readers can suggest something better.—ED.]

Rainfall and Lightning.

To the Editor of the Scientific American:

There seems to be considerable discussion through your paper in regard to the fall of rain immediately after a lightning flash.

The unquestionable explanation of this phenomenon seems clear enough to warrant but little doubt in the matter.

The fact is that rain does not follow a flash of lightning, but the lightning follows a rainfall, as a shower of rain forms a connection between the electricity-laden clouds and the earth, through which the flash passes. In fact, if rain followed lightning, it would be some time (probably a half minute or more) till the rain would reach the earth from the clouds, which is much longer than the lapse of time usually between the flash and the following rainfall.

Now, suppose a shower of rain from a cloud has reached a distance of 200 feet from the earth when a flash of lightning passes through it, striking the earth some seconds before the rain, which, following almost immediately, is said to be precipitated by the lightning, while in reality the column of water has only served to establish a communication between the cloud and the earth.

For a practical corroboration of this theory may be taken the fact that sailors usually predict fair weather when thunder is heard during a rain, which seems to argue that lightning is caused by the precipitation of rain, rather than that rain is caused by lightning.

GEO. W. WEINGART, JR.

New Orleans, Nov. 3, 1891.

Sound and Rainfall.

To the Editor of the Scientific American:

In an article by Prof. Newcomb, published in the SCIENTIFIC AMERICAN of October 17, it is stated that "the popular notion that sound may produce rain is founded principally upon the supposed fact that great battles have been followed by heavy rains. This notion, I believe, is not confirmed by statistics." As a participant in many battles of the late war, please allow me to state a few facts, which may possibly serve to correct or amplify statistics in this matter, as what I state can be confirmed by numerous living witnesses. The battle of Pittsburg Landing was followed immediately by a heavy rain, succeeded by a clear day; the ravines of that field ran red with blood, while the fields were washed clean. The cannonade was heavy. At Iuka, Miss., the guns were light, and a fine shower followed the second day; the siege of Corinth was attended with rain, and the battles of Corinth and Hatchie River, October 5 to 6, 1862, were followed, October 7, by a night of very heavy cold general rain. The forty-seven days' siege of Vicksburg was attended with heavy cannonade evenings, followed each night with brisk showers of rain before morning. About the same was characteristic of the siege of Port Hudson, La. My memory serves me that the newspaper accounts of the battles of Bull Run, Antietam, Gettysburg, Chancellorsville, Atlanta, etc., were attended by heavy rainfall.

As I have been somewhat identified with the question of artificial rain, having written on the subject over thirty years ago for a New York paper, when it was thought very unpopular and impious to make the reference, I ask your indulgence of the suggestion that steps be taken to secure accurate statistics on the subject, with a view of verification of facts concerning cannonade and rainfall. There are plenty of living witnesses to give all the facts concerning rainfall connected with battles of the rebellion, and also some of the battles in Mexico; and they would undoubtedly do so if requested. My articles, published in 1857 to 1859, made reference to rainfall attending the battles in Europe during Napoleon's campaigns; and as the question only involves battles where cannonading occurs, history is not so remote as to make difficult the collection of facts.

There is also another source of gleaning statistics on this subject, that of Fourth of July celebrations, which have been notable of rainfall succeeding the midnight cannonading simultaneously at different towns in the older settled and closely populated States. One thing is certain, whatever theories may be followed in experiment, and whatever methods employed, the establishment of any practical system of artificial rainfall must depend upon the collection, classification, and verification of phenomena bearing upon the subject.

JOHN W. EVARTS.

Thurston, Ok. Ter., Oct. 29, 1891.

Solution of Query 3600.

To the Editor of the Scientific American:

In answer to the problem 3600, propounded in your issue of October 31, 1891, I beg to offer the following solution:

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A                  B              D      C
|---- 10 miles ----|--- 10 miles --------|
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By the terms of the problem m is at A and n at B. They both travel ten hours, n straight from B to C, and m from A toward C until he catches up with n, when he returns to B. The point where m overtakes n must be somewhere between B and C—say at D. Evidently in the ten hours of his journey m travels his own 10 miles between A and B, and also twice the distance, B D, which n travels before the latter is overhauled.*

It is further evident that m, in returning from D to B, consumes the same amount of time as n does in going on from D to C (since they both finish at 5 o'clock P. M.).**

Let $x = m$'s speed per hour;

Let $y =$ B D, distance traveled by n before being overtaken.

Then we have the following equations:

$$* \; 10x = 10 + 2y;$$

$$x = \frac{y}{5} + 1; \; \ldots\ldots\ldots (1)$$

$$** \; \frac{y}{x} = 10 - y;$$

$$x = \frac{y}{10 - y}; \; \ldots\ldots\ldots (2)$$

Combining these two values of x, in equations (1) and (2), we have—

$$\frac{y}{5} + 1 = \frac{y}{10 - y};$$

$$y^2 = 50;$$

$$y = 7{\cdot}071068 \text{; and, therefore,}$$

$$x = 2{\cdot}414213.$$

Therefore n was 7·071068 miles from B when m caught him; and m traveled 17·071068 miles, at 2·414213 miles per hour, up to that moment; and 24·142136 miles in all.

REV. CLARENCE E. WOODMAN, Ph.D.

St. Paul's Church, New York, N. Y.

[We publish the above as a good example of the solution of the problem. A number of solutions, many of them wrong, have been received.—ED.]

Espadrilles.

To the Editor of the Scientific American:

R. S. asks, in your issue of October 24 (page 261), in regard to a cheap summer shoe that leaves the foot in its natural position, allows free ventilation, and does not hinder expansion of the foot in all directions.

I have found that espadrilles, worn in southwestern France and northeastern Spain, answer the above-mentioned conditions. Espadrilles are made of soles of braided hemp joined by a peculiar braided or crocheted stitch to uppers of cloth. They are occasionally worn in England and in the United States for bathing shoes, and I have seen a poor quality of them for sale in Boston.

My first use of espadrilles was while studying zoology in the Arago Laboratory at Banyuls-sur-Mer, in the eastern Pyrenees, as a protection to the feet when wading and hunting salt water animals. Liking them soon led me to wear them on land instead of shoes, as do many of the natives of that region.

The sole of braided hemp is very light, although about half an inch in thickness, and as it is of the same thickness throughout, it allows the foot to rest in a natural position. The uppers, which are not high, are made of a somewhat loosely woven strong cloth, are elastic, and allow ventilation. The hemp sole absorbs the perspiration, but the whole espadrille can be washed, after use for a month or two, if one cares to be economical and not buy a new pair. Espadrilles ara secured to the feet by a lacing of woolen tape, which crosses the upper part of the foot and ties, being elastic and quickly adjusted and fastened.

After using espadrilles in sea water they are rinsed in fresh water, to prevent retention of moisture by the salt, and dried.

The price of a pair of espadrilles in southern France varies from one franc and a half (about 30 cents) to twice that amount. They are usually made with white cloth uppers, ornamented with designs worked in brilliantly colored worsteds, while the thick soles retain the natural color of hemp. This conspicuous ornamentation and coloration constitutes the only strong objection to wearing espadrilles out of doors; but pairs can be bought made with plain black cloth uppers.

For foot races espadrilles would be very advantageous, because of their lightness, and the tender bottoms of the feet, which result from wearing impervious rubber soles, does not accompany their use. For indoor wear the more highly ornamental kinds of espadrilles are appropriate, and are preferable to leather-soled slippers. This use of espadrilles impressed me so favorably that upon my return from France I brought back with me a dozen pairs of them for wearing in this country. GEORGE DIMMOCK.

Canobie Lake, N. H., Nov. 3, 1891.

Thunder in its Relation to Rain Formation.

To the Editor of the Scientific American:

Being a constant reader of your valuable paper and its SUPPLEMENT, I have naturally become interested in the recent discussions concerning the artificial production of rain.

In your issue of October 3, Mr. A. J. James says that those who hold noise to be a potent factor in the production of condensation and rainfall "put stress also on the fact that during a storm the rainfall is greater immediately after the thunder claps." Mr. James admits the truth of this, but explains as follows:

"During the storm the small rain drops are buoyed up by ascending currents of air, and the thunder jars the atmosphere so that a number of these small drops are jostled together, and being collectively too heavy to be buoyed up, they fall to the earth."

Claps of thunder quickly followed by greater rainfall is a common and interesting phenomenon, and admits of an explanation quite the reverse, so far as cause and effect are concerned, of that given by Mr. James.

It often happens during a rain storm, when the clouds are not highly electrified and therefore not accompanied by thunder, that the rainfall suddenly increases. It is therefore evident that increase in rainfall during a storm is not necessarily due to the little drops being jostled together by thunder.

Now let us suppose the clouds heavily charged with electricity, as they often are, and see what we may expect in the way of thunder and lightning whenever there is rapid condensation and heavy rainfall, no matter what the cause of this may be.

For the sake of simplicity let us also suppose the little globules forming the cloud to be of the same size and charged with equal amounts of electricity. Now as these little globules unite to form the raindrop they carry their electric charges with them, all of which remains on the surface of the growing drop; and since the mass of a sphere varies as the cube and the surface as the square of the diameter, while its electric capacity varies directly as the surface, it is evident that increasing the diameter of the raindrops likewise increases their electric potential in exactly the same ratio, inasmuch as the potential varies directly as the quantity of charge and inversely as the capacity of the conductor.

It would thus appear, if the raindrops be rapidly formed, that the potential of each, and therefore of the whole cloud, must rise with the same rapidity and soon cause an electric discharge to the earth or a neighboring cloud.

Claps of thunder are thus seen to be the natural result of the formation of rain drops from electrified clouds. But it may yet be asked, if the thunder be the result of the increase of rainfall rather than the cause, why do we hear the thunder before we see the increase of rain?

Well, the flash of lightning is seen before the thunder is heard simply because light travels many times faster than sound, and so, too, the thunder is heard before the drops, whose formation caused the lightning flash, have reached us, simply because sound travels faster than the falling rain.

It might be well to add that often the thunder finally ceases because the rain quits forming; but the rain never quits because it fails to get the cheering claps of thunder. W. J. HUMPHREYS.

Miller Manual Labor School of Albemarle,
Crozet, Va., November, 1891.

A Curious Steamer.

A steamer which can be propelled on land by means of its own engine has just been constructed at the Ljunggren Engineering Works at Kristianstad, in Sweden. It is intended for the traffic on two lakes close to Boras, which, however, are separated by a strip of land. Rails have been laid between the two lakes. The steamer, which has been christened very appropriately Svanen (the Swan), can run itself across from one lake to the other. At a trial trip, if one may call it so, at the works, the vessel fulfilled the tests very well. The engine is 10 horse power, and the Svanen can accommodate some 60 passengers.