Gold and Silver from the Sea—A Proposed New Method for Coating Ships' Bottoms.

The method of J. Bridges-Lee, London, consists in first sheathing the vessel with copper by any ordinary accepted means, thereafter joining up the copper sheathing to the negative pole of a galvanic battery or direct current dynamo electric machine, and in amalgamating the whole external surface of the copper with mercury. The positive pole of the battery or dynamo must make earth away from the vessel. Some of the chief benefits resulting from the employment of this method will be:

1. That the exposed surfaces of the sheathing can be kept exceptionally smooth, bright and clean. The mercury will hold well to the surface of the copper and fill in any scratches or other minor irregularities, and the electric current will effectually prevent oxidation. The passage of the electric current will assist in maintaining uniform adhesion of the mercury to the copper.

2. The surface will be of such a character as not to afford good hold for barnacles and other marine organic bodies which commonly attach themselves to ships' bottoms and cause fouling.

3. Skin resistance will be much reduced, not only on account of the smoothness of the metallic surface, but also because of the development under the influence of the electric current of films of gas upon the exposed surface. If the electric energy is sufficient to cause the escape of streams of tiny bubbles all over the surface, the layers of water charged with those streams of tiny bubbles in close contact to the vessel's skin will oppose less resistance than ordinary water free from bubbles.

4. Under the influence of the electric currents, passing traces of the precious metals (gold and silver) will be precipitated from oceanic and other waters upon the sheathing, and will be there held by the mercury as amalgam. From the surface scrapings, after a vessel so sheathed and fitted has been some time afloat, the precious metals can be recovered by ordinary chemical means.

5. The gain from diminished skin resistance will much more than compensate for the cost of maintaining the electric circuit and for supplying the requisite quantities of mercury from time to time.

6. The quantities of gold and silver which may be recovered from the waters of seas, rivers, or lakes will often more than compensate for the loss of mercury, and will nearly always constitute an important item on the credit side.

In applying this method of sheathing, the ordinary rule should be followed of using the thickest copper sheeting toward the bows and thinner sheeting behind, and it will ordinarily be found best to make earth with the positive pole in advance of the ship. A result of this arrangement will be that there will be greatest electrical action over those parts of the sheath at the bow and over the areas just behind the bow and least action toward the stern, so that while gas bubbles are freely escaping from the foremost surfaces, the hinder surfaces may experience only sufficient electrical action to keep them bright and clean. There will be some economy about this arrangement, and if the positive pole makes earth in front of the bow of the ship through a metallic plate of difficultly oxidizable or non-oxidizable metal held in a vertical plane by rigid attachments projecting from the bows, the frictional resistance which it will cause need not be very serious, especially as that pole will also develop streams of gas bubbles. Of course the plane of the plate which constitutes the positive pole should be such that if extended backward it would bisect the ship and the supports should be sufficiently firm to hold it continually in that plane. The electrical connections with the galvanic battery or dynamo should be thick copper wires. The wires from the negative pole may ramify to various parts of the sheathing as may be found most convenient, and suitable switches may be provided to control the distribution. Also the positive pole may, if desired, make earth at other places besides in front of the bow, through wires or plates dipping into the water at some distance from the walls of the ship.

A Gratuitous Number.

The day of publication falling one day earlier each calendar year has gradually antedated the issue of the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT, so that in regular order the first number of the coming volume would naturally issue on Saturday, December 31.

To avoid the beginning of the new volume before the commencement of the new year, we have decided to give our mail subscribers the benefit of an extra number.

Instead, therefore, of stopping the SCIENTIFIC AMERICAN with issue No. 26, and the SUPPLEMENT with No. 886, which would give the subscriber fifty-two numbers for the year, we shall, at considerable cost, mail to him a fifty-third number. We hope our mail subscribers will recognize our liberality in presenting them with an extra paper, and favor us with a prompt renewal of their subscription.

IMPROVED PACKING AND GASKETS.

The sectional ring, expansion ring and coil packing shown in the accompanying illustration are severally made according to a patent process designed to afford a perfect lubricator, and so that the expansion will be horizontal, relieving the rod of all pressure. It is said to be extremely durable, not burning or getting hard in the box. The manhole gaskets of the same makers are said to form especially durable steam and water

DELANEY'S COIL AND RING PACKING AND GASKETS.

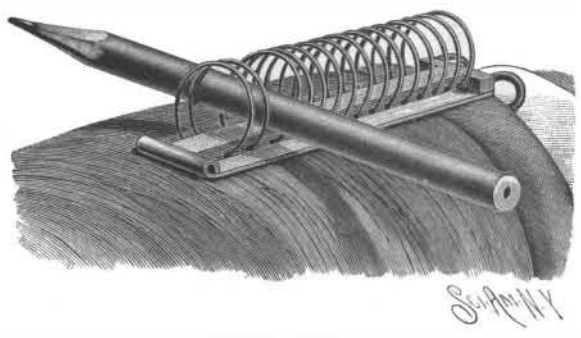
tight joints, being made to stand a pressure of 300 pounds. These goods are manufactured by Messrs. H. J. Delaney & Co., Milwaukee, Wis.

Spontaneous Combustion of Arsenic.

Recently powdered metallic arsenic which, in the process of powdering, had been moistened with water to prevent dusting, is recorded by E. Hirschsohn as capable of spontaneous combustion. A quantity of powdered arsenic in a double paper bag had been received late in the evening, and set aside overnight in a basket containing other articles packed in straw and sawdust. The next morning, upon opening the store, the peculiar garlic-like odor attracted attention to the basket containing the powdered arsenic. An examination disclosed that the arsenic had agglutinated to a solid, glowing mass; that the paper containers had been charred, and that a portion of the straw was scorched; a number of bottles in the basket had also burst, owing to the high heat, and upon the charred paper bag were sublimed some beautiful crystals of arsenious oxide. A fire, which probably would have been attributed to some other cause, was in this case averted.—*Pharm. Ztschr. f. Russl.*, 1892, 612; *Am. Jour. Pharm.*

A PEN RACK ON THE SLEEVE OR CUFF.

A convenient attachment for the sleeve or cuff of a coat or other garment, designed to hold a pen or pencil within easy reach, is shown in the accompanying illustration, and has been patented by Mr. Isaac W. Housser, of Winnipeg, Canada. It consists of a frame-piece composed of an upper and lower plate, carrying



HOUSSER'S PEN RACK.

between them the lower portions of a spring wire coil, the individual coils of which are sufficiently spread to receive and hold between them one or more pens or pencils. Attached to the holder is a spring clamp, one member of which presses against the inner side of the sleeve or cuff, gripping it with a spring pressure sufficient to maintain the holder in position on the outside of the garment. If desired, a strip of blotting paper may be held between the cuff and holder.

Rain Making by Means of Smoke Balloons.

The experiments on rain making now being conducted under the direction of General Dyrenforth in Texas recall the unsatisfactory tests of a year ago. Since presenting an article on the subject which appeared in *Science*, November 27, 1891, some few experiments have been made by the writer in preparation of an outdoor test. The lack of funds necessary for these (though the amount required is not large) has prevented the undertaking of experiments to the present time.

While the government has furnished General Dyrenforth with facilities, in general, equally applicable to methods now proposed, and as practical failure seems attendant upon his results, it would seem not unwise to test the theory advanced in the article above referred to. The gist of the theory is that dust particles in the upper strata of the air, under suitable meteorological conditions, may form nuclei where condensation may occur, and a rainfall be induced. So far as laboratory experiments go, as mentioned in that article, the presence of dust particles seems necessary for the condensation of moisture. Among other experiments mentioned, the following may be taken as interesting and suggestive. A jet of saturated steam was admitted into a large glass receiver, and the condensation of the steam showed a cloud filling the receiver. The air was then pumped out and filtered through cotton wool before being readmitted. In this dust-free air of the receiver the jet of steam was again admitted, but no trace of condensation could be seen. With repetitions of the experiments the results were the same. The conclusion seemed established, in the laboratory at least, that dust particles were necessary for condensation.

Similar conclusions are arrived at by Professor John Aitken, of Scotland, although I am not aware that he proposed any use of dust particles for the artificial production of rain. After performing these experiments in my laboratory, I was naturally anxious to try them on a larger scale in Nature's laboratory.

The objections that have been raised since the article appeared, that dust and smoke are frequently abundant in our atmosphere, especially over large cities, without the production of rain, does not necessarily prove that, should dust or smoke be let into the upper air layers, precipitation might not be caused. Further, the optical effects from dust and smoke seem to indicate that it is continually settling, and does not reach to any great height in the atmosphere above the earth. The experiments made since the above article was written were directed toward finding the substances most suitable for producing a dense and long-continuing smoke. Substances which give the densest smoke burn too rapidly. I tried various ways of increasing the duration of their burning without impairing their smoke-giving qualities. By mixing turpentine with saw-dust or with straw paper pulp, and then subjecting the mass to hydraulic pressure, the time of burning of a quarter of an ounce was increased from about one minute to twenty minutes, while the smoke given out was very dense. Balls made in this way, and two inches in diameter, would easily continue smoking over three-quarters of an hour.

From these preliminary tests, the plan proposed was as follows: To raise, at intervals of about one-half mile across country, a number of captive balloons, each capable of lifting about thirty pounds, and each containing approximately 1,000 cubic feet of gas. Suspended from each of these balloons by a light iron wire should be one of these slow-burning smoke balls weighing about 30 pounds, which could be lighted on the ground and raised by the captive balloon to about one-half mile into the upper air strata. The time for experiment must be determined by meteorological conditions. As the balls were consumed the balloons could be drawn down, new balls attached, and the balloons allowed to rise, and in this way over a considerable extent of country considerable smoke could be gradually turned into the upper layers of the air.

The chief expense in such an experiment would be for the balloons, which would cost in the neighborhood of $100 each. No expensive explosives are necessary, and as the Texas experimentalists seem provided with balloons, the experiments could be conducted there without appreciable expense to the government.

It was proposed by the writer to make a series of tests in the State of Kansas, but the comparatively small sum of money necessary is not available, nor will other work at present allow.

The reiteration of this dust theory for the artificial production of rain is given in the hope that it may suggest to others its desirability and a method of experimentation. A theory which has at least a laboratory verification is certainly worthy of test on a larger scale, and the expense of such testing is certainly not prohibitive. It need not be mentioned that such experiments should be accompanied by meteorological observations, and from these a place and time wisely determined.

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