

Correspondence.

Sulphur Flies.

To the Editor of the SCIENTIFIC AMERICAN:

The Mountain Copper Company, Limited, whose furnaces are six miles west of here, mine and roast from one thousand to twelve hundred tons of ore a day. The ore is composed of iron and copper sulphides carrying eight per cent copper and forty-four per cent sulphur besides gold and silver values. This ore is brought from the mine on the railroad and dumped in piles fourteen feet wide, six feet high, and two hundred feet long, sufficient wood to start it burning being placed in the bottom. It is then fired and left to burn for thirty days, when the roasted product goes to the blast furnace for smelting into matte. During the roasting process the sulphurous acid fumes evolved are so dense that respiration is almost impossible in their vicinity, and a coating of sulphur two inches thick is often formed on the outside of the heaps. After the heaps have been fired and the roasting well under way, there is a species of fly about the size of a large horse fly, having a gray body and a proboscis identical with the horse fly, that takes up his abode in these steaming, smoking heaps, and apparently lives and breeds in them. The lower portions of the heaps fairly swarm with them, and at night the workmen are compelled to wear netting over their faces, and gloves to resist their attacks, their bites being quite poisonous. For the want of a better name, the miners will call them sulphur flies. They seem to thrive in the densest fumes which are irrespirable to a human being. Is any such insect known to any other locality? They were never known here until the smelting operations commenced some three years ago.

GEORGE A. FITCH.

Redding, Cal.

[We asked the opinion of Dr. L. O. Howard, Entomologist of the United States Department of Agriculture, in regard to this matter, who states that the occurrence is very unusual and that he had never heard of anything of the kind. He intends to investigate the matter.—ED. S. A.]

The Economy of High Pressure Steam.

To the Editor of the SCIENTIFIC AMERICAN:

The economy of steam at high pressure is dependent upon the fact that the total heat of steam generated at high pressure is but little more than that of steam generated at low pressure. It is worthy of note that James Watt partly understood this property of steam. He, however, was wrong in believing that the total heat necessary to change water at zero temperature to steam at any temperature was constant. The total heat of steam increases with the pressure, but not so rapidly as that pressure, nor does it even bear a constant ratio to it. It is evident, from what has been said, that any increase in pressure will not be accompanied by as rapid an increase in number of heat units; hence the economy of high pressure.

A few examples will bring this out more clearly. If a pound of water at 70° F. be converted into steam at 50 lb. pressure, a certain amount of heat is necessary to effect this change. Now, 1 lb. of steam at 100 lb. pressure could do considerably more work than the same weight of steam at 50 lb. could do, but an examination of formulæ shows that the total heat of the steam at 100 lb. pressure is but little more than that of the steam at 50 lb. pressure.

Let us now insert these pressures in the formula showing the temperature of steam at different pressures:

$$t = \frac{2938.16}{6.199 - \log p} - 371.85$$

in which t = temperature of the steam in degrees F. and p = pressure in pounds.

Logarithm 50 = 1.699 and 100 = 2.000. Solving, we find the temperature to be 281.07° at 50 lb. pressure and 327.86° at 100 lb. pressure.

Let us now put these values in the formula for the determination of the total heat of steam at different temperatures:

$$H = 1091.7 + 0.305 (t - 32^\circ)$$

in which H = number of heat units and t = temperature of steam in degrees F.

Solving, we find total heat of steam at 281° to be 1166.4 heat units, and at 328° to be 1180.5 heat units; but, as we started with water of 70° F., in one case we have used $1166.4 - 70 = 1096.4$ heat units, and in the other $1180.5 - 70 = 1110.5$ heat units.

Hence the extra 50 lb. pressure only required 1110.5 - 1096.4 = 14.1 extra units.

HARRY STRATTON.

Tiffin, O.

It may not be well known that there are a number of aeronautical journals published. L'Aeronaute and La France Aérienne are both published in Paris. The Zeitschrift für Luftschiffahrt is published at Berlin, and the Illustrierte Aeronautische Mittheilungen at Strasburg. The Aeronautical Journal is published by the Aeronautical Society of Great Britain, at London.

Miscellaneous Notes and Receipts.

In order to tone silver pictures deep black, the following receipt is very useful, owing to its simplicity and reliability. Dissolve 1 gramme of gold chloride, 1.5 gramme of uranic nitrate and 15 grammes of borax in 2,000 grammes of water. After being toned, the pictures must be specially fixed, since a durable toning-fixing bath cannot be produced when using the above chemicals.—Technische Berichte.

A new style of shoes has appeared of late. The connection between soles and uppers is not effected in the customary manner, but both are screwed together in such a manner that the screw-heads are in the interior, while the screw-ends become riveted by wearing the shoes, so that an undesigned loosening of the sole is impossible, while the simplest connection imaginable of sole and vamp is thus created.—Technische Berichte.

To Dye Billiard Balls Red.—As soon as the ivory ball is finished it is laid in a vessel and covered with water. For one billiard ball the admixture of two teaspoonfuls of vinegar and one gramme of aniline red is sufficient. For a deep red take coralline, for amaranth use eosine, for crimson fuchsine is employed. When the ball has the desired shade, it is rinsed off with clear water and, after drying, polished with soap and Vienna lime.—Deutsche Tischler Zeitung.

The Cracking of Crucibles.—The cause of the frequent cracking of crucibles may be traced to the fact that the walls contain moisture. With quick heating the same is transformed into steam, which cannot escape quickly enough, and, in consequence of overheating, takes on a tension, which finally the walls of the crucible can no longer resist, thus causing the cracking at the largest diameter. In order to guard against this evil, it is advisable to heat the crucible slowly before use, so that the moisture held in its walls can evaporate. This previous heating should be done, even if the crucible is well dried out, not having been used for melting, but kept in damp and cold rooms.—Die Edelmetall Industrie.

A New Use for Electric Vehicles.—A case was reported recently of a clever application of the electric storage battery of an automobile described as follows: A woman had received a complicated fracture of her arm, too complex for the physician to accurately locate. He then decided to make use of a Roentgen ray apparatus for this purpose, but found the patient too weak to be removed. He obtained the apparatus, but, having no source of electricity convenient to operate it, called an electric cab by telephone. The current from the battery in the cab was conducted to the apparatus by special wires which successfully operated it and enabled the physician by the usual observations to locate the fracture in the arm and set the latter quickly.

It is said improvements are to be introduced in these vehicles whereby they can be made immediately serviceable to doctors in emergency cases.

Lacquers and Varnishes.—A good, cheap priming varnish for furniture consists of shellac 60 grammes, Burgundy pitch (white resin) 60 grammes, and $\frac{1}{2}$ good rectified alcohol. With this mixture the article is treated in a warm, dry room. A good black ground can be produced by grinding fine ivory black with a sufficient quantity of spirit shellac varnish in a stone dish, using a pestle, until a perfectly fine black varnish is produced. In order to obtain other shades, the light varnish is mixed and ground with a quantity of a suitable pigment, such as vermilion or Indian red for red; chrome green or Prussian blue and chrome yellow for green; Prussian blue, ultramarine, or indigo for blue; chrome yellow for yellow, etc. Black is the color mostly employed; the following recipes being productive of a nice black ground:

1. Asphaltum, 1 part; copaiva balsam, 2 parts; and oil of turpentine as required. The asphalt is melted over the fire and mixed with the balsam, which has previously been separately heated; then take the whole from the fire and mix with oil of turpentine.

2. Moisten good lamp black with oil of turpentine, grind both together in a fine mortar, add a sufficient quantity of ordinary copal varnish and grind it all thoroughly.

3. Asphaltum, 90 grammes; oil varnish, $4\frac{1}{2}$ liters; burnt umber, 120 grammes; and oil of turpentine as required. Melt the asphalt, stir it into the oil varnish, which has likewise been heated, add the umber and gradually the oil of turpentine. The following formula is said to produce an especially fine black appearance: Amber, 360 grammes; purified asphalt, 60 grammes; oil varnish, 0.1 liter; resin, 60 grammes; oil of turpentine, 480 grammes. UMBER, ASPHALT AND RESIN ARE CAREFULLY MELTED TOGETHER, THEN THE HOT OIL IS ADDED AND ALL IS AGAIN STIRRED UP CAREFULLY AND MIXED WITH OIL OF TURPENTINE AFTER COOLING. White priming varnish is prepared from copal varnish and zinc white or starch flour. The number of varnish coatings varies from 1 to 6 or more, but each layer must be perfectly hard before the next one is put on. The last coat, as a rule, consists of pale varnish without pigment and for valuable articles is subsequently polished with soft leather and tripoli, while for ordinary goods the gloss obtained in the enamel oven is sufficient.—Polytechnisches Notizblatt.

Science Notes.

The sewers of Paris are now being searched for treasures, owing to the recent discovery by workmen of a bundle containing \$120,000 in securities.

"The latest American idea for the sheathing of vessels to prevent fouling and corrosion is to sheath them with glass plates, which is said to be entirely feasible." The above item is from The Engineer, of London. While this may be true, we have heard nothing about it, and it sounds suspiciously like paper bicycles and other things of like order, which seem to exist only in the minds of newspaper reporters.

The British Eastern Australasian and China Telegraph Company filed a claim with the State Department of the United States for \$36,000 damages for cutting its cable by Admiral Dewey at Manila last May. The United States Attorney-General has now rendered a decision finding that, according to international law, there was no ground for a claim for indemnity where a military commander cuts a cable within the territorial waters of an enemy.

Petit Bleu, of Brussels, recently had a curious experience in which it was shown that no one is indispensable in this world. The composers having struck, the text accompanying the illustrations was written out on the typewriter; then the typewritten sheets and the copy for the pictures were pasted on large sheets of cardboard and the whole was reduced by photography to the required size. From this negative a photo-engraving was made from which the paper was printed.

The authorities of the Southern Metropolitan Gas Company, an English corporation, have added workmen directors to the board of the company. The report stated that the profit sharing system, which was introduced in 1889, continues to justify its existence, as it induces a generally intelligent interest in the welfare of the company on the part of its officers and men. Two of the workmen were elected by the workmen shareholders to sit on the board, and the result so far has proved very satisfactory.

According to The Medical Sentinel, it has been ascertained by careful observation that certain families in a village of St. Ourn, France, enjoy absolute immunity from tuberculosis. They are gardeners of excellent habits who intermarry among themselves and keep apart from the immigrant laborers. The latter suffer severely from the disease. It is considered probable that hygienic conditions are not the sole cause of the difference, but that by a kind of natural selection a race immune from tuberculosis has been developed.

Caisson disease, or compressed air disease, is a malady which is often contracted by those who are engaged in engineering work in positions where they are subjected to great air pressure. Dr. Thomas Oliver has observed several cases of this kind, and he has arrived at the conclusion that the symptoms are best explained by the theory that the malady is due to increased solution by the blood of the gases met with in compressed air, and the liberation of these gases during decompression. The increased solution of the gases is due, of course, to the greater pressure upon the person of the caisson worker.

The old "Physic Garden," at Chelsea, which was leased to the "Apothecaries' Company" in 1673, and presented to them by Sir Hans Sloane in 1722, is to be placed under a Committee of Societies and the garden is to be maintained for promoting the study of botany with special regard to the requirements of general education, scientific instruction, and research in systematic botany, vegetable physiology, and instruction in pharmacy, as concerns the culture of medicinal plants. New offices, lecture rooms, and laboratories are to be provided. The old "Physic Garden" was one of the oldest, if not the oldest, botanical garden in the world, and is of considerable historical importance.

We were much surprised the other day in looking over the "R. I. B. A. Calendar," the official publication of the Royal Institute of British Architects, to find that a "water finder's" advertisement had been admitted into the annual of that conservative society. The fallacy of the divining rod has been demonstrated many times by scientists, but it appears to be not at all well understood in England. The advertisement goes on to say that, if anyone desires to have water discovered, "you cannot do better than engage the service of the well-known water finder, who undertakes to search for water for any parties required in any part of the country and to carry out the work, if desired, by special agreement. No water, no pay." The last few words are comforting, but, if we mistake not, a badly advised English municipality recently had to pay a considerable sum out of their pockets to an alleged water finder who found no water supply. Unfortunately, we believe that this decision has now been reversed on the flimsiest of technical grounds. The divining rod myth should be exploded by this time, and those who attempt to obtain money by its use should be severely punished.