## Correspondence.

### Safety Devices Wanted.

To the Editor of the SCIENTIFIC AMERICAN:

The loss of life from runaway accidents in this country mounts up to the hundreds yearly, so that very many people, especially women, fear to ride or drive. The best of horses are timid among steam cars, trolley lines, bicycles, and the thousand and one things one meets nowadays on our roads. Cannot some of your inventors design a safety brake that will stop the crazy beast, or a device to detach him from the vehicle and let him go headlong by himself, or blinders to blind him, or a throat latch to choke him?

There is money, and a good deal of it, to be made by a good, effective device of some kind for this purpose.

WM. H. HIGBEE.

New York, July 19, 1895.

### Science Notes.

Molybdenum.—Mr. Moissan recently reported the results of his researches on molybdenum to the French Academy of Sciences. He fused the metal easily and in great purity in the electric furnace. Its density is 9. It is a metal as malleable as iron, is easily filed and polished, can be forged when heated, and scratches neither glass nor quartz. Being very free from carbon and silicon, it does not oxidize in air unless at a dull red heat, and can be preserved for days in water without chemical change. In the presence of air, it becomes covered with an iridescent film like steel. When heated with carbon, it forms a steel much harder than pure molybdenum. It will be useful in the purification of Bessemer steel as a substitute for manganese, since the compound, being volatile, will not mix with the slag.

Boiler Incrustation.—Mr. G. Lievin, says Le Genie Civil, has just pointed out to the Academy of Sciences the property that crude petroleum possesses of preventing incrustation in steam boilers. The Comptes Rendus publish merely the following extract from a study that evidently interests the Academy but slightly, and that might better have been submitted to the Society of Civil Engineers or the Society of Encouragement:

"We add a few cans of crude petroleum to our feed water, and never have had any new incrustations. The deposit of mud that sometimes forms in the boilers is expelled at the close of work through the mud cock at the bottom, when the pressure of the steam is not so strong."

Toxicity of the Fluorides.—There is no doubt, says the Pharmaceutische Centralhalle, that the fluorides will soon find extensive application both as preserving agents for food and as antiseptic medicines. Their progress seems only to be checked by the fears entertained of their poisonous nature. Experiments made with animals, however, show that they can take immense quantities of fluorides with perfect impunity, and, even after continued use, no poisonous effects result. Tappeiner finds that although sodium fluoride is more poisonous than other alkaline salts, it would be necessary for an animal of one thousand pounds weight to swallow at least one thousand liters (beer refuse?) per day before toxic effects would ensue. He estimates that a fatal dose would have to consist of 0·5 kilo. to each kilo. of body weight. Goats and dogs have also been experimented upon and given daily for three months from 0·3 to 0·5 gramme of sodium fluoride with their food without being any the worse for their experience. In the case of the former, the milk was even not in the least affected. The effects produced on human beings seem, however, much less favorable. Mr. A. G. Bloxam purposely consumed a piece of salmon which had been lying for three months in a five per cent solution of sodium fluoride. After eating, salivation set in at once, followed by sickness and diarrhœa, and in the night the circulation became very slow. He estimates that the quantity of sodium fluoride consumed amounted to about 5·5 grammes.

Musk.—The odor of musk is very widely diffused in nature, both in the vegetable and animal kingdoms. Of the former may be instanced the common musk plant Mimulus moschatus, Dougl.) and the seeds of the Abelmoschus moschatus, Medii, Hibiscus moschatus, Lin., which are employed by the French under the name of ambrette as a substitute for animal musk. In the animal kingdom there are several pervaded with the musky odor among insects, quadrupeds and reptiles; but for commercial purposes musk is solely obtained from the male of the musk deer (Moschus moschiferus).

This strong perfume is in demand all over the world. The Chinese have known it for many ages, bordering as their empire does on Thibet and Siberia. They call it che-kiang, "che" being the name of the animal, and "kiang" meaning perfume.

The musk deer lives in Thibet, Yunnan, Sze-tchuan, and more sparsely in Pielschi-li, or Chili, North China. Manchuria also furnishes it. The principal depot of the musk trade is the city of Tachien-lu, in about 30° north latitude, west of the province of Sza-chwan. Thibet and Annam are the principal musk-producing districts. Silungchan, in Kwangsi, and Wutingchan, in Yunnan, are probably the chief markets for the musk shipped from Canton.

Mr. R. Lydekker contributed a paper to the Journal of the Royal Asiatic Society of Bengal, in 1880, stating that the musk deer there was of common occurrence, and probably extended north of that district in most of the open countries up to Thibet, and thence across or round the Gobi desert into Siberia. There are two commercial kinds of musk, the Tonquin of Thibet, received chiefly from China, and the Cabardine or Siberian, from India. As the interior or Indian consumption is not taken into account, probably 20,000 deer are actually killed, male and female. In some adult males the pod will contain over 2 ounces, but an ounce may be taken as the usual average. Many of the deer killed when young will only average, all round, half an ounce. In most of the hill states of India, the musk deer is considered a royal property, and the rajahs keep men purposely to hunt it. The Cabardine musk, which is inferior to the Tonquin, is believed to be obtained from a species of musk deer called "Kubaya," probably Moschus Sibericus.

The Hydrogen Wall in Electrolysis.—To obtain a greater efficiency in the reduction of the highly electropositive metals, such as potassium, from aqueous solutions, Mr. L. Pyke, at the recent Royal Society soiree, showed the "hydrogen wall." He produced an amalgam of the metal under reduction by placing the mercury cathode in a porous vessel. The amalgam is in its richest condition at the top of the porous vessel, which is the part furthest removed from the liquid. The precise action of the device is said to be the prevention of the liberation of hydrogen at the electrolytic contact surface.

Electricity in the Bessemer Process.—What may turn out to be one of the greatest inventions of the age was recently tested at the Homestead Steel Works and proved very successful. It was the test of a plan for reheating steel by electricity under the Bessemer process. Steel men have tried to solve the problem of preventing the chilling, but all have failed. Mr. C. M. Schwab, manager of the Homestead plant, and Mr. A. C. Dinkey, head electrician, recently put their minds to work on a plan to obviate the difficulty by the use of electricity. A heat there was allowed to become somewhat "cold," and the electricity was introduced. The effect was startling. The molten steel, about twenty tons, that was lying dead in the ladle, immediately began to boil, and in a few minutes reached a white heat. The blaze ascended several feet above the ladle and was of blinding intensity. The steel was poured, but over a dozen workmen had their eyes burned badly.

Sources of Colors.—An interesting enumeration has been made by somebody and published in a technical journal of the sources of color. From this it appears that the cochineal insects furnish the gorgeous carmine, crimson, scarlet carmine and purple lakes; the cuttlefish gives sepia, that is, the inky fluid which the fish discharges in order to render the water opaque when attacked; the Indian yellow comes from the camel; ivory chips produce the ivory black and bone black; the exquisite Prussian blue comes from fusing horse hoofs and other refuse animal matter with impure potassium carbonate; various lakes are derived from roots, barks and gums; blue black comes from the charcoal of the vine stock; Turkey red is made from the madder plant, which grows in Hindostan; the yellow sap of a Siam tree produces gamboge; raw sienna is the natural earth from the neighborhood of Sienna, Italy; raw umber is an earth found near Umbria and burned; India ink is made from burned camphor; mastic is made from the gum of the mastic tree, which grows in the Grecian Archipelago; bister is the soot of wood ashes; very little real ultramarine obtained from the precious lapis lazuli, is found in the market; the Chinese white is zinc, scarlet is iodide of mercury, and vermilion is from the quicksilver ore cinnabar.

### Armor Tests.

Orders have been sent to the Norfolk Navy Yard to prepare a section of the side of a ship, which, when completed, will be shipped to the Indian Head proving grounds, where a 14 in. ballistic plate, representing a group of armor for the sides of the battleship Iowa, will be fitted to it. This structure will be exactly similar to the section of the side of a vessel. It will be fired at with a 12 in. gun first, to try the armor for acceptance, and if the plate passes the ballistic test, it will be fired at with a 13 in. gun to obtain the effect such an impact will have on a vessel's side. Heretofore the knowledge of the department regarding the action of projectiles on ships sides has been largely theoretical, the actual experience being confined to the results obtained from the impact of projectiles on plates fitted to 36 in. of solid oak backing. Another interesting experiment will be made with armor plate bolts to ascertain whether or not it is feasible to shorten them. Bolts for heavy plates now weigh 150 lb. each and are troublesome and expensive to put in place. A bolt prepared by the Board, consisting of Naval Constructors Stahl and Capps and Professor Alger, is greatly reduced in length and weighs 50 lb. less than the larger size. The total weight saved on these bolts in fitting armor plate to a ship would average about 25 tons—a saving the authorities are anxious to make. Bolts of this size will be arranged at the Indian Head proving grounds to hold armor to backing and will be fired at. The result of this experiment will develop the size of bolt to be used in fitting armor on the new battleships.

### The Sheathing of Iron Ships.

The most economical and durable method of sheathing ships to prevent fouling is a subject of great interest to all, and a most valuable contribution on the subject, from the experience of the Admiralty, has been communicated to the Institution of Naval Architects by Sir William White.

The only records available up to the present time have been those contributed by the late Mr. Grantham, in 1869, chiefly based upon experience gained with the composite ships of the mercantile marine. In the Royal Navy wood had been largely—indeed, chiefly—used in the construction of various classes of unarmored vessels. The information now given is essentially as regards the behavior of sheathing applied to complete iron or steel hulls, and as this has been practically outside mercantile experience, the procedure has been necessarily experimental in the navy to a large extent.

There has been considerable divergence of opinion as to the best metallic sheathing to be used on iron and steel ships. The advocates of copper and zinc respectively had each strong points to urge: galvanic action between iron and steel and copper, in which the former would be the sufferers, was feared, whereas it was pointed out that zinc in its relatively electrical position to iron and steel would practically protect the latter. Under the test of experience zinc, though protecting the iron and steel, has failed to recommend itself as a material that would maintain a clean bottom. The formation of insoluble salts on the zinc, by the action of the sea water, soon causes serious roughness on the bottom and tends to fouling.

On the whole the conclusion has been arrived at that the extra expense of external copper sheathing, as compared with zinc, is more than repaid on subsequent service by economy of coal and maintenance of speed. What remains then is to find the most durable and economical way of mounting such copper sheathing on iron or steel hulls, and to neutralize the tendency to destructive galvanic action upon the iron or steel. It was first attempted to produce these results by laying two skins of wood planking between the iron skin and the copper, the inner planking being attached by through bolts to the iron skin and the outer planking to the inner by brass screw bolts passing into, but not intended to pass through, the inner layer.

This arrangement has not, however, given satisfactory results so far as our navy is concerned, the planking having been permeated by the sea water and electrical continuity with corrosion having been set up. Sir William White, after full consideration, has laid down the principles of what he believes to be the most effective system as follows:

1. The adoption of such a thickness of single plank sheathing as will admit of thorough calking. The mean finished thickness of teak accepted is 4 inches for large ships and 3½ for the smaller classes. 2. The use of naval brass bolts and nuts with their points screwed through the skin plating and with thin plate washers fitted underneath the nuts. 3. The thorough water testing of the skin plating before planking is worked. 4. The most careful fitting of the planks, the coating of all faying surfaces with suitable compositions, and subsequent injection of composition after the planking is in place. 5. The use of hempen grommets steeped in red lead under bolt heads and plate washers.

Six years' experience has fairly shown that such a sheathing is satisfactory and practically watertight. The skin when so sheathed may be practically reduced in thickness as compared with an unsheathed hull, and the minimum of planking is required. In case of injury the single planking is easily and cheaply removed for repairs.

Careful observations in the Royal Navy in European waters have shown that after five or six months afloat unsheathed ships have required 20 to 25 per cent more power to maintain ordinary cruising speeds than when clean, and after ten to twelve months this increase of power required would amount to from 40 to 50 per cent.

For vessels, therefore, that have to keep the sea for twelve months without docking, the conclusion is irresistible that they must be sheathed to maintain their speed efficiency, and that the saving in docking and cleaning expenses and in fuel must be a handsome return on the extra expense of sheathing.—Marine Engineer.