Correspondence.

The Double Topsail Rig.

To the Editor of the Scientific American:

Reading the very interesting article in your last issue suggests to my mind that one of the most important inventions of the last half century ought to have been noticed therein. I mean the introduction in the country of what is now known all over the world as the double topsail rig. It must be classed as one of the greatest labor-saving and life-saving devices. I claim not the credit of its invention, for it was known in the northern seas of Europe a hundred years ago, as applied to small vessels, in what are known as topsail schooners. The foremast head, or what is called the doublings of the mast, was longer than usual, and the topsail was set on the heel of the mast and the sail above it was set on the mast above the cap. This was called top-gallant sail; but, in point of fact, *it was a double topsail.* This rig first called my attention to fitting large vessels in a similar manner in the auxiliary steamers Massachusetts and Edith, 1844–45. Not long after I introduced the rig Captain Howes made some changes in the details, and took out a patent and made money out of it, and the old rig is now practically extinct all over the world, except in some naval ships, which are always slow to adopt new devices for lessening labor.

The double topsail rig not only lessens labor and risks to life, but is also a great saving of property, and is admitted by seamen as one of the greatest blessings ever bestowed on the toilers of the sea. I read also what is said in regard to the destroying of floating wrecks, and am glad to see that the Navy Department has ordered a steamer on the duty of destroying them. If we knew of a vessel floating about at sea with lives on board, expeditions would be sent to the rescue. As these derelicts are as dangerous as shoals, or even more so, because they are constantly shifting their position, no pains should be omitted to destroy them.

I recommend the Secretary of the Navy to order all training ships to cruise for them. No more useful work can be done.

R. B. FORBES.

Milton, Mass., May 11, 1889.

Lines of Electrical Induction.

Some very pretty experiments may be made, and the lines of electrical induction between two electrified bodies may be shown extremely well, by the use of the fine white needle-like crystals of sulphate of quinine suspended in a good insulating liquid, such as pure turpentine. To perform the experiments, take a flat glass dish and pour in turpentine to the depth of about a quarter of an inch, sprinkle this with sulphate of quinine evenly distributed till the turpentine assumes a milky appearance. If now a brass ball connected by a chain with an electrical machine be placed at one end of the vessel, and another connected with earth at the other end of the vessel, on working the machine the crystals of quinine will become polarized and take up their positions end on end, forming very distinct curved lines between the balls in exactly the same way as iron filings form in lines of magnetic induction when sprinkled over a magnet. The symmetrical lines of white crystals when shown up by a dark background look extremely beautiful. We have here the basis for a set of experiments which may be diversified to an almost unlimited extent by varying the number and shapes of the electrified bodies placed in the turpentine.

The fact that there is no electrical force within a hollow conductor may be very prettily shown by connecting both of the balls in the above experiment with the machine and placing in between them a large metal ring connected with earth. The curved lines are then very distinctly shown running from each ball to the ring, but within the ring the turpentine remains in the uniformly cloudy state in which it was initially, the crystals showing no disposition to place themselves end on end. The difference in the appearance of the quinine particles outside and inside the ring is very striking. If now a small third ball be connected with the machine and placed in the center of the metal ring, the appearance of the turpentine within the ring is entirely changed, and the crystals form in straight radial lines from the center to the circumference.

By multiplying the number of the electrified balls, charging some positively and others negatively, the resulting lines of induction may be made very complicated, but, provided that there is a fair space between the balls, the lines are always distinctly and clearly mapped out by the crystals. It is an easy matter to obtain some very beautiful figures by symmetrical distributions of the electrified bodies.

In making the experiments it is very necessary that the turpentine should be pure and dry, as a very slight amount of impurity is sufficient to destroy its powers as an insulating medium. Benzine will answer, and it possesses the additional advantage of not dissolving any of the quinine, while turpentine dissolves it to a slight extent, but its specific gravity is so small that the crystals fall to the bottom of the vessel almost at once, and adhere to it, so that they will not easily take up the lines unless the experimenter be sufficiently quick to electrify the balls before the particles reach the bottom. On the whole, turpentine I have found to give the most satisfactory results. After the crystals have once been electrified inductively in this way, they appear to take up the lines much more easily a second time. It seems as though the molecules do not recover altogether from the effects of the electric strain.

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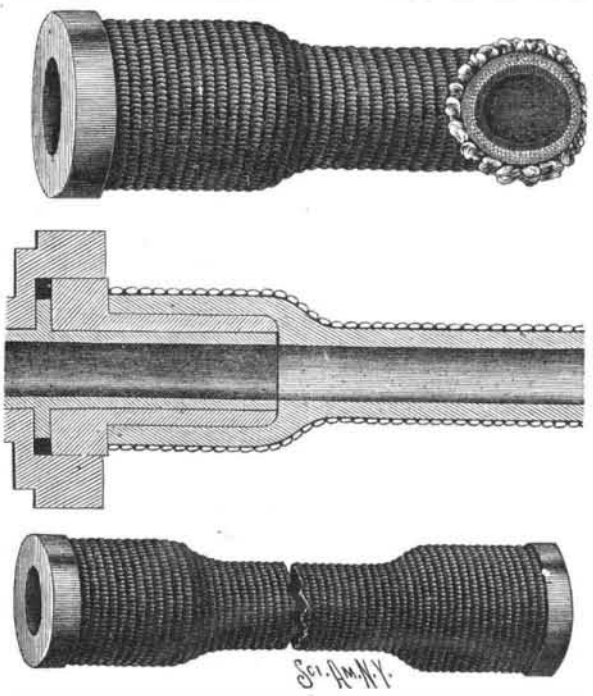
AIR BRAKE HOSE.

The illustration herewith presented represents, in section and perspective, a new form of high pressure hose, in which the hose is strengthened at the coupling, where it is ordinarily the weakest. In general, when hose is covered with wire or canvas, the covering stops at or just before the actual couplings, leaving a space that is not protected right where the most wear comes. In this hose the canvas and the woven cover come entirely over the metal parts making the coupling, and a full rubber cushion is made at the terminus of each section, whereby a perfectly air-tight joint can always be made, without friction or wear of the parts. The hose here represented is made stronger than usual, so that it is not likely to kink, the canvas covering being adapted to stand 1,000 pounds pressure, and to hold its inclosed rubber tube entirely tight, while the outside woven cover, which is specially treated, is an additional close, strong, and solid protector, insuring long wear. It is said that this hose has satisfactorily proved its eminent serviceableness by very severe tests. It is made by the



AIR BRAKE HOSE.

Boston Woven Hose Co., also manufacturers of rubber hose and belting and mechanical rubber goods, No. 234 Devonshire Street, Boston.

Some Northwestern Weather.

Dakota is a sort of breeding ground of weather, and it would be strange if occasionally something unique in the atmospheric line were not produced there. The stories that come from there about recent meteorological phenomena show that something of the kind has been prevalent there during the past week.

To begin with, there was a period of two or three weeks without rain. Then the wind arose and blew the soil like snow, so that a dirt storm occurred, which was like a snow storm in appearance, but far worse in its effects. Spring wheat was blown clear out of the ground and whole fields were cleared of their top soil to a depth of several inches. Drifts of sand and dirt occurred in partially sheltered places, which were in some cases three feet deep.

But more remarkable things remain. The atmosphere was so charged with electricity that it was dangerous to touch metallic bodies. An end of barbed wire that had become loose set fire to a field of grass. A cow passing along by a barbed wire fence would sustain a continuous fire of sparks from the barbs that looked in the dark like a fusillade of musketry. In fact, the Territory was pretty nearly in a state of spontaneous electrical combustion.

At last the welcome rain came—a genuine soaking rain—and all the wheat that was not blown out of the ground will grow finely. That which was blown out will come up probably, but it will be on the roofs of houses, in dooryards, in city streets, and on the clothes of persons who got caught in the rain after being out in the dust storm.

There were no forest fires in Dakota, for the very good reason that Dakota has no forests; but the woods in parts of Minnesota, Wisconsin, and Michigan have been afire for some days, and a large amount of property has been destroyed. The rains have now put out some of these fires, but, so far as can be learned from the reports, some of them, in Michigan especially, are still raging, and further damage will be done. These are trying times in the Northwest.—*N. Y. Mail and Express.*

The Poisonous Quality of Respired Air.

MM. Brown-Sequard and D'Arsonval have made a further statement to the Academie des Sciences respecting their discovery of a poisonous principle in water condensed from respired air. New researches, made at the beginning of last year, have shown that this poison, be it simple or multiple, which accompanies expired air, is able in small quantities to kill even without being directly injected into the blood. This toxicity is not due to the presence of microbes in the pulmonary liquid, for the same effects are produced by it after having been subjected to a temperature of 100° C. in a closed vessel. During the past year many experiments have been made to determine the action of the pulmonary poison as it exists in respired air mixed with pure air, the results of which have completely confirmed what has been learnt respecting this poison by other methods. An apparatus has been used for this purpose, which, while showing the poisonous property of respired air, has also permitted it to be demonstrated that the carbonic acid of this air has nothing to do with its toxicity.

The apparatus consists of a series of metallic boxes connected with each other, but shut off from the outer air by sealed joints. An aspirator connected with a gas meter draws a measured current of air through the series of boxes, one after another. It consequently follows that an animal shut up in the first box breathes pure air, while others inclosed in successive boxes must breathe air more and more vitiated. Every care is taken to provide for the drainage of the boxes. It was found that animals shut up in these boxes died sooner or later, according to their distance from the fresh air box, although the proportion of carbonic acid never became more than 2 or 3 per cent of the air which proved most deadly. Pure carbonic acid in the proportion of 20 per cent of the air was breathed by the same animals with impunity. Also when the pulmonary poison was arrested by passing the air containing it through a washing chamber charged with concentrated sulphuric acid, which would not have any effect upon its carbonic acid, the toxic quality disappeared. Hence it may be deduced that the atmosphere of all badly ventilated rooms, occupied by men or warm-blooded animals, is charged with an unknown active poison which would kill all the inmates if they remained long enough under its influence, and even in a short time affects their health.

Headache.

The etiology of many forms of headache is still quite obscure. Dr. A. Haig maintains that one variety of periodic headache is directly due to the retention of uric acid in the system. The usual sequence of events, according to him, is as follows:

There is a time (say seven to ten days) of good general health, active nutrition, and bodily activity, with plus formation of uric acid and urea, and concomitant rise in acidity. As acidity rises, uric acid comes to be retained, and at the end of four or five days several grains may be regarded as stored up in the liver and spleen. Then come dyspepsia, gastro-intestinal catarrh, and hepatic congestion (and Dr. Haig is not by any means certain that this hepatic congestion and gastro-intestinal trouble may not be the direct result of the accumulation of uric acid in the liver and spleen). These quickly result in general diminution of absorption and nutritive changes, with lessened formation of uric acid and urea and a fall in acidity; and lastly, as the result of this falling acidity, there comes a rush of the stored uric acid into the blood, and the headache begins.

Such a sequence may be seen to some extent in the figure that accompanies his paper on headache (*Transactions*, 1887), for there the urea drops from five hundred and sixty-one grains to three hundred and sixty-three grains in the four days that immediately precede the headache. Although acidity was not estimated in this instance, there can be no doubt that it followed and shared in the fall of urea to a large extent. Such a sequence explains the periodicity of this kind of headache, and the way in which it comes to occur every week or ten days for many years, varying only in degree with the corresponding variations in nutrition. It is also evident that any causes which affect digestion will influence the attack in one of the above ways; while all causes of debility, by weakening the nerve center on which the uric acid acts, will render it more sensitive (the reverse of the action of bromides) and the attacks more frequent. A knowledge of these facts gives him almost complete power either to cause or cure this headache in himself and other sufferers.

The good effects of salicylic acid, and the salicylates generally, in this variety of headache, are due to the circumstance that they facilitate the excretion of uric acid, and thus prevent the retention of excessive amounts within the body.—*Medical Record.*