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Gun Cotton and Collodion.

When gun-cotton was first discovered, no other idea was entertained respecting its application than that of superseding gunpowder as an explosive agent. Since that period, however, it has, like galvanism, been applied to quite a number of useful purposes, as the principal ingredient of collodion. Common cotton is one of the forms of *lignine*, which is a compound of carbon, hydrogen and oxygen (the same as wood), but when subjected to the action of nitric acid, nitrogen enters into its composition, and this element is found in a great number of explosive substances.

In 1833, M. Braconet, of Paris, made the discovery that starch, sawdust and cotton wool, when treated with concentrated nitric acid, became very inflammable, taking fire at a temperature of 356° Fah., but were not really explosive. This invention remained merely as a chemical curiosity until 1846, when Professor Schonbein, of Vienna, made the discovery of rendering cotton explosive by the use of sulphuric acid combined with the nitric, in treating it. The following is a summary of his process for making gun-cotton, described in the specification of his foreign patent, secured in 1847:—

"Take nitric acid of the specific gravity of 1·45, and sulphuric acid of 1·85 specific gravity, and mix them in the proportion of three parts of sulphuric and one of nitric acid, and allow the mixture to cool to 60° Fah. The rough cotton, which should be thoroughly cleansed from extraneous matter, is immersed (in as open a state as possible) in a glazed earthenware vessel, and, when thoroughly soaked in the acid, is lifted, and the excess of acid squeezed out gently by a glass rod. The cotton is now covered over in a glass vessel, and left thus for an hour. It is then washed well in cold water, to remove the free acid, and is squeezed between rollers in a press, or, if a small quantity, between the hands; after which it is washed in a weak solution of carbonate of potash, (one ounce dissolved in a gallon of water,) to insure its freedom from acid, then dipped into a weak solution of saltpeter, (nitrate of potash,) is then pressed dried, in a warm room, and is fit for use."

Three parts (by weight) of gun-cotton thus prepared is equal in strength to eight parts of the best gunpowder. Great hopes were once entertained that it would be generally employed for all kinds of fire-arms, because it is so cleanly, and leaves no dirty residue behind it; but it ignites so rapidly, and is so liable to burst fire-arms, that it is dangerous to use, hence gunpowder still maintains its position for army and hunting purposes, except in Austria, where, as we learn by recent accounts, it is used for artillery. For mining purposes, however, it is certainly superior to gunpowder, and is now extensively used in Europe for blasting rocks. Another application of it has become very extended, namely, in preparing collodion—a discovery made by Dr. Maynard, of Boston, Mass., about seven years ago, and first applied as an adhesive plaster for wounds in surgery. This composition is made by dissolving gun-cotton made with the nitrate of potash (a substitute for nitric acid), and sulphuric acid dissolved in ether and alcohol, and is made as follows:—

Take finely powdered nitrate of potash, 40 parts, by weight, concentrated sulphuric acid 60 parts, and carded cotton 2 parts. The nitrate and the acid are mixed together in a porcelain vessel, the cotton added, and stirred in it with a glass rod for about four minutes, then the free acid is pressed out, the cotton washed in cold water, and dried in a loose mass, at a moderate heat. Take rectified sulphuric ether 125 parts, by weight, rectified alcohol, 8 parts, and cotton, 8 parts. The latter is added first to the ether, in a well stopped bottle, and the mixture shaken for some minutes, when the alcohol is added by degrees.

The gun-cotton prepared as stated is very soluble in the ethereal mixture, forming the well known collodion. When applied to wounds, or the surface of any object, the ether rapidly evaporates, leaving the gun-cotton adhering with wonderful tenacity, and forming a nearly transparent skin, air-tight, and almost impervious to water. It is employed in forming the fine cuticle on paper, and on glass plates for photographic purposes, and has been the means of greatly improving the art of sun painting; it is also used for gilding, in architectural decoration, and a patent was recently issued to an inventor in this city for this beautiful application of it. By coloring with pigments, it has been employed for some time in the manufacture of French artificial flowers. It will readily be perceived how it is now extensively used as a valuable substance in surgery, photography, architectural decoration and for personal ornamentation, and may yet be applied to a hundred other different purposes.

The Steamship Central America.

Since we directed attention to the necessity of inventing improved means for saving life, and preventing such calamities as befell the above unfortunate steamer, we have received several communications on the subject; but we must say, that while it is not so difficult to suggest new and good plans of safety, it is very difficult to have them carried out by the owners of vessels, if they entail extra expense. This is a miserable piece of policy on their part, as every means which they take to ensure the safety of their vessels and the lives of their passengers, even at considerable extra outlay, ultimately leads to enlarged profits, by an increase of traffic.

A correspondent writing to us from Stockton, Cal., on this subject, suggests that all steamers carrying passengers should have the berths made with galvanized iron bottoms; and cylinders or tubes capable of being opened, and closed by tight covers, for the reception of passengers effects, and provisions and water in bottles, should be placed in some of them for cases of emergency. These berths may be fastened with clasp rings and bolts, to enable them to be rapidly put up and taken apart. In case of an accident to the vessel, the captain can order each passenger on deck with his berth, a number of which berths can be fastened together by their rings and clasps to form several life-boat rafts of a very superior character. But if the sea is too high to admit of them being formed into rafts, each passenger has his own berth as a personal life-boat to ensure him a means of safety, if the ship should go down.

If such berths had been on the *Central America*, in all likelihood nearly every person on board would have been saved. That they can be applied to all passenger vessels, we do not entertain a doubt, but will they? that is the question. Life-boat berths are not altogether a new idea, as cork and india rubber life-preserving mattresses, which are so well known, embrace the same features; but they have never been generally adopted on board of vessels, so far as we know.

Another correspondent writing to us from Baltimore, Md., on the same subject, states that a very old seaman in that city suggests that every vessel which goes to sea should be provided with a false deck, which should be made so as to float from the true one, if the vessel should sink, and thus form a life-raft for passengers and crew. This false deck may be made in sections to lie upon the true deck, and should be supplied with hold-fasts, to prevent persons being washed overboard. Provisions and water casks should be kept lashed on it, for the hour of necessity. This is also a good suggestion; but while it is right to make every provision for such dangers when they occur, attention should be chiefly devoted to the prevention of such catastrophes by insuring, if possible, the perfect safety of the vessels themselves.

The committee of enquiry in this city, appointed to examine into the cause of the loss of the steamer *Central America*, have just made a report in which they positively assert that it was lost from sheer carelessness on the part of those who had charge of the engines. They say, "On the morning of the 11th Sept., at 7 o'clock, the ship labored to such an extent as to alarm the passengers and arouse the captain and chief engineer, who were in their berths or state rooms; and about noon, the gale still increasing, she fell off from the wind, and it then appeared that the fires in the engine-room had, by some unexplained carelessness, been allowed to go down, and had become so low that the engines gradually relaxed their speed and finally stopped working, and the steamer fell off into the trough of the sea."

The plain inference to be drawn from this is, that the *Central America* would have weathered the storm had the steam been kept up, and that from carelessness on the part of the engineers, this steamer, with quite a number of passengers, was lost. There seems to be defective organization in the management of our steamships. Most of the passengers on the ill-fated *Arctic*, we believe, would have been saved, had proper discipline ruled on board. The *Central America* had a defective crew, was without a carpenter or carpenters' tools, and the engineering department and that of the general government of the vessel under the captain appear to have been nearly independent of one another. This should not be; the whole management of steamers, like that of sailing vessels, should be under one supreme head. This is a regulation which should be carried out, and for this purpose, it is necessary that the captains of steamers should have a tolerably good acquaintance with the marine engine, to do their duty efficiently.

Light and Color.

So intimately are all our ideas of things material connected with light, that it is impossible for a human mind to conceive or form any distinct appreciation of this world, or the heavens of which it forms a part, and by which it is surrounded, before the issuing of the Almighty mandate, "Let there be light." The beauty of the fitness of all things is in no way more truly appreciated, than when we consider the diffusion and adaptability of this omnipresent, elemental force. Each beam of the pure, colorless light of day is composed of three distinct rays, the red, the blue, the yellow, and these and their compounds or complimentary colors, form the beams that travel from the sun to us in eight minutes. All nature derives its color from these colored rays, and really there is no such thing as actual color, it is only decomposed light. Thus the tender, modest violet pushing its tiny loveliness from among the coarser plants on some hedge side, is so constructed that it absorbs all the rays except the violet one, and that it reflects, and this reflection is the color of the plant; the hardy old red sandstone cliff absorbs all rays but the one shown in its color, and the same is the case with all created things. This fact of all objects being really colorless, is easily proved by a simple experiment that may be tried by our juvenile readers any winter's evening. (Here we would say that it is our intention to give occasionally, as we have space, special articles with simple experiments, each teaching some philosophical truth for the juveniles' instruction and amusement, these long and dreary winter evenings.) Now then for the experiment: collect as many articles of different colors as you can in a small room, the more glaring the hues, the more astonishing the result; when this is done, pour some alcohol on a plate and throw into it a handful of common salt, light it, and it will burn with a yellow flame, and all the gaudy colors will be gone, nothing but one dead yellow being visible, even the color is taken from the cheeks and dresses of the spectators, all of them appearing a ghastly hue; thus proving that color depends on light and not light on color.

Three Weeks More and the Result Will be Settled.

We would call the attention of our readers to the fact that there are only three weeks more before the successful competitors for our prize list of *Fifteen Hundred Dollars* will be rewarded for their exertions.

Every one who has entered the field of competition cannot expect to reap the reward in cash, but fifteen of those who have best succeeded in obtaining subscribers for our publication will receive, in the aggregate, fifteen hundred dollars, in sums varying in amount to each, according to the number of mail subscribers they have sent in to us, and paid for, since this volume of the Scientific American was commenced.

Those few who entered the course for competition when the announcement of the prizes was first made, but who have not, from their own inertness, or from the pressure of the times, continued in the contest, will, we hope, feel that they are well repaid for the exertion they at first put forth, in the consciousness that they have done their neighbors and townsmen a favor by introducing the Scientific American to their notice, and inducing them to subscribe, and thus insure the weekly visit of a paper in which no information of a pernicious or demoralizing character appears; we regret to say this can be asserted of but very few literary papers of the present day. The benefits and pleasures which these subscribers and their families derive from the weekly visit of the Scientific American, we leave for each patron to estimate for himself.

A few days ago, we were led by curiosity to foot up the amounts remitted to us by a single competitor, and, from the names sent, to calculate whereabout in the list of prizes he would stand: we found to our astonishment that, if the awards had been made on that day, the competitor in question would not only have received back the full amount which he had remitted for all his subscribers, but would have received the additional sum of $160. We ceased our calculations when we arrived at this result, fearing lest we might arrive at still less satisfactory conclusions to ourselves by looking into the prospects of other competitors.

This example shows what an opportunity still remains for some of the smaller competitors to augment their lists of names during the next three weeks, and then to receive a respectable sum for their exertions, over and above the total investment.

Polishing Glass, Metal, &c.

In polishing plate glass and other substances on a polishing bed having an unbroken flat surface, and using therewith a fine polishing material in a moist state, all air is excluded from between the polishing bed and the slab, or substance under operation, consequently the pressure of the atmosphere on the back of the slab is the cause of great friction, which necessitates the exercise of very great power to produce the motion necessary for polishing. In order to overcome this difficulty, Phineas Burgess, of this city, has invented and patented (in Great Britain) an improvement which consists in grooving the surface of the polishing bed in circles, eccentric to its axis of rotation. By grooving or otherwise similarly reducing the surface of the polishing bed, for the purpose of admitting air under the slab, the retarding atmospheric pressure will be materially reduced.

The above improvement was secured by patent through the Scientific American Patent Agency.

Iron Planes for California.

We have received a communication from a correspondent in Auburn, Cal., in which he states that common bench and molding planes made of wooden stocks are unsuited to the dry climate of that country, as they warp and become unfit for use. He believes that planes made with iron stocks would be more suitable to the climate, and that a general assortment of such, well made, if sent out there, would find a ready market.