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THE SCIENTIFIC AMERICAN SUPPLEMENT.

No. 24.

For the Week ending June 10, 1876.

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Imitation Silver on Stone and Plaster.

Take two sheets of mica, and render them perfectly white by boiling in hydrochloric acid, or by the action of fire. Wash and dry, and then bruise them to fine powder, which sift. Mix the powder with very light collodion; and with a soft camel's hair brush, put two or three layers on the object. This coating, as soon as dry, will assume and preserve the appearance of silver.

SPONTANEOUS COMBUSTION.

We noted, recently, a case of spontaneous combustion due to the saturation of sawdust and shavings by boiled linseed oil. The refuse had accumulated under the floor of a carpenter's shop, through cracks in which the oil had leaked, and the first intimation which the occupant of the premises had of his impending danger was a thin wreath of smoke oozing up between the boards. Instances of this kind are exceedingly common; so common, indeed, that it may be fairly believed that a very large proportion of the fires, the immediate causes of which frequently baffle all attempts at discovery, arise from the flame thus insidiously generated. A case lately happened within our own knowledge, where a gentleman, who had left his house for a brief period unoccupied, returned late at night to find the building filled with smoke and his kitchen woodwork in a light blaze. Prompt measures luckily resulted in extinguishment of the fire; and on investigation it was found that a servant had employed a closet shelf as a receptacle for old greasy dishcloths and oily rags used for cleaning furniture. The ignition of such materials, always favored by a slight warmth, was hastened by the temperature of the kitchen, and the rapid oxidation soon determined active combustion.

It has been determined by experiment that a handful of cotton waste soaked in boiled linseed oil, placed in a chamber at a temperature of 170° Fah., will take fire in less than two hours. If raw linseed oil be used, the time occupied is from four to five hours, and with rape oil about six hours. Gallipoli oil takes about the time last mentioned, under 132° Fah. Castor oil, under like circumstances, is very slow; and at the end of two days, waste saturated with it only became a mass of charred cotton. Lard oil produces rapid combustion in about four hours. Sperm oil, on the other hand, refuses even to cause a charring of the waste. Seal oil, of a strong fish odor not unlike sperm, has produced rapid ignition in one hundred minutes, temperatures being as last stated. The heavy oils from coal and shale, being chiefly the higher olefines, have a remarkable effect in preventing oxidation, through giving a certain protection from the air. Mixtures of these oils with 20 per cent of rape oil gave no indication of heat whatever at 170° Fah.; and even seal oil, with its own bulk of mineral oil added to it, did not at 135° reach a temperature sufficient to char cotton.

As a general rule, it may be laid down that spontaneous combustion of refuse, soaked with vegetable or animal oils, will occur whenever the conditions are such that a temperature of at least 175° continues for several hours. Cotton will burst into flame; wool, on the other hand, becomes a blackened mass. Equal weights of cotton and oil produce the most rapid inflammation. Combustion may be checked or stopped by the addition of mineral oil. Wherever vegetable or animal oil (other than sperm) is largely used, therefore, whether for lubricating machinery or oiling tissues, it would seem to be a safe precaution to add to it as large a proportion of mineral oil as possible, if such addition can be made without interfering with the use of the material.

WHAT IS BAD WATER?

There has recently been some complaint in this city regarding the condition of the Croton water, which has appeared muddy in color, owing to its being slightly charged with organic and other substances. As the Croton is normally of exceptional purity and clearness, the presence of the foreign matter excites attention which would not be accorded it were we accustomed to drinking such water as is consumed from the Thames river in England, or from the Mississippi or Monongahela rivers in this country, where muddiness is rather the rule than the exception. In New York, however, we have the satisfaction of knowing that our water supply is undefiled. No town or factory refuse passes into it; and therefore it is reasonably certain that such impurities as may affect it are those due to natural causes, and not to the addition of extraneous matter which may be deleterious to health. But this is not the case everywhere; and in localities where the supply is taken from adjacent rivers and streams which pass through populous districts, any change in the water may bode its pollution to a degree which renders it unfit for human consumption; and indeed, the same result may happen without the water visibly indicating the fact, save by its effects. This trouble has been found seriously to exist in England; and for several years the subject of the river pollution, which is a necessary consequence of the closely settled country and its immense manufacturing districts, has been under examination by government commissions of scientific men.

Among other objects of the investigation has been that of determining what bad water is, or rather at what point, whether through mechanical or chemical impurities, pollution of the liquid may be considered as beginning. In a recent report, Professor Frankland answers the question of what a polluted liquid is as follows:

(1) Every liquid which has not been submitted to precipitation produced by a perfect repose in reservoirs of sufficient dimensions during a period of at least six hours; or which, having been submitted to precipitation, contains in suspension more than 1 part by weight of dry organic matter in 100,000 parts of liquid; or which, not having been submitted to precipitation, contains in suspension more than 3 parts by weight of dry mineral matter, or 1 part by weight of dry organic matter, in 100,000 parts of liquid. (2) Every liquid containing in solution more than 2 parts by weight of organic carbon or 3 parts of organic nitrogen in 100,000 parts of liquid. (3) Every liquid which, when placed in a white porcelain vessel to the depth of one inch, exhibits under daylight a distinct color. (4) Every liquid which contains in solution, in every 100,000 parts by weight, more than 2 parts of any metal, except calcium, magnesium, potassium, and sodium. (5) Every liquid which, in every 100,000 parts by weight, contains, in solution, suspension, chemical combination, or otherwise, more than 0·5 of metallic arsenic. (6) Every liquid which, after the addition of sulphuric acid, contains in every 100,000 parts by weight more than 1 part of free chlorine. (7) Every liquid which, in every 100,000 parts by weight, contains more than 1 part of sulphur, in the state of sulphuretted hydrogen or of a soluble sulphuret. (8) Every liquid having an acidity superior to that produced by adding 2 parts by weight of hydrochloric acid to 1,000 parts of distilled water. (9) Every liquid having an alkalinity greater than that produced by adding 1 part by weight of caustic soda to 1,000 parts of distilled water. (10) Every liquid exhibiting on its surface a film of petroleum or hydrocarbon, or containing in suspension, in 100,000 parts, more than 0·05 of such oils.

By the aid of the above, it is easy to determine what streams are polluted and what pure; and when the feeders to the source whence the water supply is obtained are found to be thus contaminated, it becomes a question for the authorities to determine as to the necessary restrictive measures to prevent the continuance of the evil. Of course, a stream cannot be regarded as polluting when, although containing deleterious ingredients in a greater degree than is above laid down, it empties into a source of water supply which is even fouler: so that the question of whether a stream is a means of pollution. and hence a public nuisance, is one of a relative nature, depending on individual circumstances.

A SOCIAL PERIL.

The confession of the Boston belfry murderer, Piper, reveals an instance of a mental condition, the evil results of which seemingly defy any preventive measures that society can devise. It shows us that we have to face a new danger, more insidious and more terrible than are magazines of dangerous explosives located in our midst. We can recognize symptoms of lunacy and put the sufferer under restraint: if not before, at least immediately after he has slaughtered one fellow being; but what are we to do with those who exhibit no symptom of mental alienation, but who kill again and again for the love of killing? Unlike the lunatic who makes no effort to hide the crime, or the assassin who in his cooler moments betrays the work done in the heat of passion, these wretches are destitute even of a twinge of remorse, and their covering of the deed is performed with a coolness and thoroughness to which the murderer for greed or revenge is a stranger.

This man, Piper, confessed to have killed two victims, not because he was impelled to do so by any ungovernable impulse, but for a clear motive of self-gratification; he liked "to see them suffer." It appears that the very heinousness of the crimes has caused the idea that the perpetrator was insane, and should not have suffered the death penalty, a notion we think unfounded and fraught with great mischief to society. There is the clearest possible distinction between the case of Piper and of a man who kills through morbid impulse. True morbid impulse, for example, impels a man to lie in wait for and to murder the person who his diseased deliri ous imagination supposes is about to do him some terrible injury. He is perfectly aware of his wrong-doing, but is so impelled to its perpetration that he cannot avoid it. Now, on the other hand, if while in a delirious state he should act according to his reason, no matter how perverted, and then strike down his victim, there is no morbid impulse; nor would there be any, should he commit suicide to avoid some imaginary impending calamity. Note the distinction which is here thus closely drawn: it lies simply in the fact that the murderer is irresistibly impelled to the deed. He does it not merely because he thinks it expedient for his safety, but because he *must* do it.

Now, in this Boston case, morbid impulse is obviously wanting, although it has been predicated on the apparent absence of motive to the crimes. Here is again an error; for there was a motive of the strongest possible description, namely, that of the love of killing; the same motive which induces a brute to slay its natural prey in infinitely greater numbers than are required for its food, and identically the same passion which, in a less dangerous form, finds its gratification in the combats of gladiators or the deadly fights of animals. It is as easy to imagine that such a passion might gain an ascendency as well as the passion for drink, or any other of those which civilization endeavors to curb and repress. There is no insanity in the case, any more than there is in that of the drunkard or the gambler whom the law looks upon as perfectly responsible for his actions.

The vital question, however, is: How is society to protect itself against this evil? Necessity points to the prompt extermination of those affected with the killing lust wherever detected. Reformatory measures seem unavailing; for who can say that, by preventing a person killing his fellows for a certain time, or by submitting him to a certain treatment, a desire which has almost become an instinct will be obliterated? In any event, while society can afford to risk the relapses of a thief, it cannot those of a murderer; nor can it, by immuring him for life, risk the possibility of future mistaken leniency in the shape of a pardon. This, however, only disposes of those persons actually detected, and prevents their subsequent crimes only. How to protect ourselves, against affected persons whose murderous disposition has not actually been manifested, is a problem which must be solved by eradicating such sources of moral contagion as we know to exist.

Despine, the celebrated French psychologist, records that, during the first empire, a soldier hanged himself in his sen-