

miliar face was no longer seen around the premises; and when the month had elapsed, the apparatus was removed and is still on storage, waiting for a claimant.

Many more such examples could be cited, and there are few consulting engineers who have not met with a number of such cases in their experience. But the trial to which this cut-off was subjected was made in the interest of no one, being intended simply to determine the truth in regard to its value.

CHLOROFORM DANGERS.

The death of another patient in the dental chair, while under the influence of chloroform, again attracts public attention to the dangers attending the use of that anæsthetic. This latest accident occurred in Boston, and the opinion of the physicians points to the fact that the lungs of the deceased were affected by consumption, and hence unable to throw off the influence of the volatile spirit. However, the jury impaneled at the coroner's inquest ignore in their verdict the previous condition of the patient, and, while asserting that the death was due directly to the inhalation of the chloroform, add that, owing to our present lack of knowledge regarding the same, its use as an anæsthetic is utterly unjustifiable. They also recommend legislative enactments to prevent its administration.

The distressing effects of sulphuric ether, upon a large class of patients, more especially those of extreme nervous temperament, have been the cause of the preference given to chloroform by many physicians. It is argued that the latter anæsthetic is not dangerous so long as the inhaler's heart is not affected, and that its more speedy action in producing insensibility is eminently advantageous in many surgical operations. But these claims in its favor, it must be conceded, are greatly outweighed by the consideration that, while there are repeated instances of death being the direct sequel of the administration of chloroform, there is no record of ether ever having produced fatal results.

It does not appear needed, however, that legislation should interfere to check the use of chloroform, since the growing tendency of the medical profession is in favor of pure ether as a substitute, or else a mixture of chloroform, ether, and alcohol, which, we understand, produces good results without causing the dangerous depressing effect of the chloroform or the nausea of ether. The employment of nitrous oxide in dental surgery is also greatly extending; and since it is both a harmless as well as an agreeable anæsthetic, it possesses peculiar advantages in connection with the rapid operation of removing teeth, or, in fact, with almost any case in which a minute or two of time is ample for the purpose.

As regards the proper treatment of patients who fall into a dangerous syncope while under the influence of chloroform, there is some difference of opinion among physicians. The most recent mode of procedure (which the eminent French surgeon, Dr. Nélaton, not long since deceased, as well as Dr. Sims, of this city, both state to be very efficacious, having in six different instances saved the patient's life) is as follows (we extract it from the *Tribune*). These surgeons had come to the conclusion that death from the inhalation of chloroform was immediately caused by a want of proper determination of blood to the brain. "The want of this stimulant to the brain's action rapidly led to the suspension of other vital organs of the economy. When, therefore, M. Nélaton's patient, upon whom he was operating, suddenly ceased to breathe, he caused his legs and body to be elevated, the head hanging downward. The blood, by specific gravity, tended to the brain. Artificial respiration was kept up, and after a time the patient again began to breathe of his own volition. He was laid back upon the table, and the operation was about to be continued, when it was noticed that he had again ceased to breathe. The same process was gone through with, and again the patient was resuscitated. A third, and even fourth, time he relapsed into the state that would have been death, and each time his breathing was restored by this process. The fifth time he relapsed, the effects of the anæsthetic had almost passed off; and, while the patient was suspended in the air, head downward, and when artificial respiration had just ceased, with the returning regular breathing he asked M. Nélaton why they were holding him in that extraordinary position. The operation was finished without further administration of the anæsthetic, and it resulted successfully. In the other cases the patients were resuscitated, the medical men having charge of them testify, by the same process. These cases are considered enough to demonstrate, with a reasonable degree of certainty, the proper treatment to be followed in cases of syncope and approaching death, from the inhalation of chloroform."

MASTERS AND MEN.

Great captains have not always been those best able to plan brilliant campaigns or best able to make the most of the varying vicissitudes of war. But whether great in strategy or not, they have always been men who could get the best work out of their followers: captains whose presence was inspiration, whose commands were prophetic of victory because certain to be carried out.

"Who ever saw such tactics?" grumbled the veterans of Italy, when the young Corsican knocked their enemies right and left with his handful of men, winning victories not so much because of his audacity and military genius, as because his soldiers could be depended on to do what they were sent to do. Then, as afterward, the great secret of his success lay in the unbounded personal devotion he inspired in those by whom his victories were won, a devotion which he took great pains to justify, by honoring faithful service to the utmost.

The great captains of industry have ever been of like dis-

position. They have succeeded, not because they excelled their rivals as marketmen or financiers, but because they could get more and better work, and trustier service in every way, from the men they employed. The best work wins, other things being equal. This is one of the great lessons so strikingly enforced in Parton's lecture on "Kings of Business," a lecture crammed with illustrations of successful enterprise, drawn very largely from direct study of the operations of American business kings.

At the Cambria Iron Works, where 7,000 men are employed making iron and rails, the President of the company was asked the secret of such a great development of business. The reply was: "We have no secret. *We always try to beat our last batch of rails.*" This persistent endeavor to excel, not others only but themselves, is the master key to the success of many.

Another lesson is that the surest way to turn out uniformly good work is to employ good men and treat them well. Said the manager above quoted, the other day: "We find that the more we do for our men, the better they do for us." In this Saxon sentence, the experience of hundreds of business kings is crystalized. Justice wins justice. The rudest workman will do more honest work gladly for the man who does the fair thing for him and his family, than the hardest driver can get by other means. The wisest selfishness is just if not generous: a lesson which small men never learn.

The country is full of illustrations. We have in mind two establishments of the same sort, within cannon shot of each other, which may stand as types of the extremes of management in this respect.

Half a century or so ago, a sterling business king became controller of a new establishment for mining and manufacturing purposes. The country was new, rough, and unattractive; yet a thriving village soon sprang up, with stores, churches, schools, and all the other accompaniments of a well-to-do and self-respecting community. The men employed were carefully selected, well paid, and fairly treated. The works were eminently successful; their various products soon won an honorable name, not only throughout this country, but abroad; and the brand of the establishment was a guaranty that every article was what it should be.

The king died. The heirs were of the meanly selfish sort, caring only for their immediate income, and taking no interest in the works save to get out of them all that they could with the least trouble to themselves. They lived at a distance, and regarded their employees merely as parts of a great machinery. What they were or how they lived, they did not care. The management of the works was committed to agents, subject to the minutest control from headquarters. Naturally, meanness could command only mean tools, and the character of the directors was soon stamped upon everything connected with the works. Merit ceased to be regarded. The good men whose honest work had contributed to the success of the father soon drifted away, to be replaced by men of lower grade, themselves to be displaced by those yet lower. The strongest claim for service was irretrievable indebtedness to the company, or pliability at the polls, in gratifying the petty political ambition of the managers. Irregular working, strikes, breakdowns, and other business drawbacks became common; and after some years of decadence, the once thriving business collapsed in utter failure. Meantime, the exodus of the honest and saving had depleted the village of all that had made it worth living in. The school degenerated, the church became the playhouse of window-breaking boys, the stores were closed or turned to grogeries, and a low-lived rabble made life miserable in the place of a once respectable community. As this town went down, the adjoining village rose. The owners of the works, round which the village clustered, lived among those they employed, and sought to surround themselves with the best men they could get. Still more: they sought to make their workmen better for being in their employment. Thrift was encouraged, and the unthrifty systematically weeded out. The men were made to understand that they were expected to be better off at the end of each year than at the beginning. Not to be so, accidents excepted, was to hazard their continued employment. Yet the unfortunate, the sick, and the bereaved were looked after with a kindness that could not be misinterpreted. The wives of the partners—genuine ladies—made it their business to know and visit the women folk of all the employees, winning their confidence and esteem by sisterly service in times of trouble, and aiding them at all times by judicious counsel, or, if need be, with more substantial help.

It is needless to describe the development of a village where the ruling influence bears steadily toward good government, good schools, good society, sobriety, and universal thrift. Floods destroyed and fires laid waste now and again, but help was always ready for the deserving; and though surrounded by colonies of rude miners, colliers, and the like, and largely composed of men of rough employments, the village became and remains a worthy representative of our best manufacturing towns.

It is needless, also, to describe the prosperity of the business by which and for which the town exists. In employments of such a nature that the indifferent or evil-disposed can destroy or waste in five minutes more than he can earn in a day, the advantage of careful, honest, trustworthy, and interested help is enormous. By dealing justly with their men, the rising company gained while their meaner rivals lost, and won a handsome fortune and the lasting esteem of their men whom they had helped to competence and comfortable homes; while the others were hated for the poverty they engendered in their descent from wealth to merited bankruptcy.

That men have been mean, hard, grasping, and ungenerous to their help, and yet have amassed wealth is undeniable, just as generals have won victories with mutinous soldiers; but these cases are relatively rare, and the success so won is not only precarious, but liable to most unexpected reverses. Our great manufacturing establishments have not been built up by such management. As Parton tersely puts it:

"Traverse the world over, search the history of our race in all times; and wherever you find a man truly superior to his fellows, a natural king of men, born to command, you will find him attentive to the interests, and to the feelings, and to the dignity of those who execute his will. If he is not man enough to be so from good feeling, he is man of business enough to do it from policy. If there is any one here who snubs persons dependent upon him, begrudges them their just compensation, cares nothing for their interests or their honor, that man is not naturally a master; he is one by accident only: he belongs, by birth or breeding, or both, to the class of the defeated and the servile. He is merely a beggar on horseback, and perhaps stole the horse."

THE DEVELOPMENT OF SUBTERRANEAN HEAT.

A gentleman engaged in the mining of lead, a Mr. Ewing, of Joplin City, Mo., has written for an explanation of some curious phenomena which have recently occurred in his vicinity. They took place in sinking the shaft of a lead mine. The shaft had been sunk 96 feet, and a drift, located about 16 feet above the bottom of the shaft, had been driven about 40 feet. At the time the work was going on, nothing unusual was experienced; but a short while after, the temperature of that portion of the drift situated about two thirds the distance from its opening into the shaft, along a space of 15 feet, began to augment. It finally rose to 102° Fah., while the temperature at the mouth of the drift and in the body of the mine remained at 60°. The miners, on attempting to cut another drift through that portion of the earth which thus increased in temperature, at right angles to the former, were compelled to stop work on account of the oppressive heat. "In one minute's time after entering the warm space, a person will sweat freely. No bad effects are felt, the lamps burning as freely as on top, and the air being good. In the heated portion of the drift, its walls are covered in spots with a substance in appearance like mold from dampness. It proves, on closer examination, to be a greasy or waxy substance, which at a lower temperature becomes as solid as clay, and resembles tallow and beeswax mixed together. It dissolves readily in water, and dyes cloth yellow."

At the time of receiving the specimens which accompanied the letter, they were quite hard, though friable, and appeared like a hardened, unctuous, greenish-yellow clay. It was evident, from the fact that a change had taken place after the earth in the drift had been exposed to the atmosphere, that we ought to find the results of this change by an analysis of the substance, and thence be able to infer the original bodies out of which it had been formed. It proved to consist of: Silica and clay, 9'499; sesquioxide of iron, 25'170; protoxide of iron, 0'438; sulphuric acid, 31'640; water, 33'030. Total, 99'777, which were probably combined as: Silica and clay, 9'499; protosulphate of iron, 0'918; hydrated persulphate of iron, 72'960; hydrated sesquioxide of iron, 5'880; water, 10'520. Total, 99'777.

These analyses reveal, in a very striking manner, the cause of the remarkable liberation of heat. A large amount of pyrites has existed finely disseminated throughout the earth. On exposure to air and moisture, it has absorbed both with great rapidity. We have no determination at hand, giving the number of thermal units equivalent to the oxidation of one pound of iron pyrites, and the subsequent conversion of the protoxide and sesquioxide of iron into hydrated sulphates; but it must be a large number, as shown by the great elevation of temperature. Although we are not aware of such a phenomenon as this having occurred in sinking a shaft in lead mining, yet similar occurrences are common in coal mines, and have produced many serious accidents. In the great piles of "slack" heaped up around the mouths of the pits of the Lehigh & Wilkesbarre Coal Company, many small pieces of sulphur can be found, produced by sublimation from the decomposing pyrites. It is said that on sinking a pail of water into one of these slack heaps, the water may be made to boil, and cook an egg. The heat thus developed, operating upon the finely divided carbon of pyritous bituminous shales, may at times reach to the height of rapid combustion.

The subject is one full of interest, and of high importance, as affording one explanation of volcanic action, and of the occurrence of sulphur deposits in connection with these phenomena. It is stated by Lyell that, when moistened iron filings and sulphur are buried in the ground, in the course of a few hours the temperature rises, the ground is swollen by expansion, and finally flames arise, or there is an explosion. By the hypothesis of similar chemical actions on a great scale, certain geologists have endeavored to account for all earthquake and volcanic disturbances. A. R. L.

WE are gratified by receiving a large number of letters, from subscribers to the SCIENTIFIC AMERICAN, approving of the folding, cutting, and pasting of the paper. These features add to the expense of publication; but we believe that our old patrons will influence enough new subscribers to compensate for the extra cost.

THE consumption of coal per train mile on the London and South Western Railway shows an average of only 28'0 pounds, against fully 45 pounds on the eight other principal British lines.