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(Illustrated articles are marked with an asterisk.)

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For the Week ending September 4, 1880.

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Table listing contents of the supplement by section: I. ENGINEERING AND MECHANICS, II. TECHNOLOGY, III. CHEMISTRY, IV. PHYSIOLOGY AND HYGIENE, V. PHYSICS, VI. NATURAL HISTORY, ETC., VII. MICROSCOPY, VIII. ARCHITECTURE.

THE INSPECTION OF STEAM BOILERS.

There is no doubt that a steam boiler is in many respects a much more dangerous neighbor than a powder magazine. In order to be safe a steam boiler needs continual attention and care, while neglect or ignorance may have the most fatal results. In regard to a powder magazine, all it needs to be perfectly safe is to be left alone.

It is a peculiarity of human nature that familiarity with danger begets contempt of the same; hence that owners and managers of steam boilers have proved themselves so neglectful that all civilized governments have enacted laws to secure more safety against steam boiler calamities.

We have such laws, but unfortunately they are not sufficiently effective, and this for several causes: first, they are not framed according to the full light which science and experience has shed upon the subject; they only require a test of hydraulic pressure of the boiler, a test which will not reveal weak spots which may be the result of faulty design, imperfect construction, or wear by age—weak spots which, being worn down so far that they could just stand the pressure of the test, soon after, by continued wear, give out at a lower pressure.

A third cause is the incapacity of many of the inspectors, who used to be appointed after an examination so ridiculously easy that any schoolboy who has learned his lessons in natural philosophy can pass it.

The thorough investigation to which the Sewanhaka disaster referred to above has given rise shows that a small weak spot in a tube in the rear of the furnace, by suddenly giving out, threw a jet of steam forward, which, like a back draught, threw the fire out of the furnace doors and ash pit, and set the dry woodwork around at once in a blaze.

There is one consolation after such calamities, not for the poor victims and their relatives, but for the survivors and the public in general. It is that every such incident teaches a lesson which makes the future more safe in this regard. The disaster in question promises to be especially useful in this respect. It will result in a revision of the laws on steam boiler inspection, on the choice of the men to be appointed as inspectors, and on their behavior after being appointed, convincing them that they are not irresponsible for the consequences of their carelessness in giving certificates for old and worn out boilers, as was the case with the Sewanhaka. They have, as well as the owners of the boat, been arrested for manslaughter.

In regard to the revision of the law, the best which can be done is to adopt the mode of inspection practiced by the steam boiler inspection and insurance companies in London, England, and in Hartford, Connecticut. These companies, who make themselves responsible for damages to boilers under their charge, are not satisfied with the mode of inspection prescribed by the United States law, but add to this a thorough test of all parts of the boiler by means of the hammer handled by a practical expert, who in this way can detect any weak and dangerous spot.

Statistics are there to prove the results. While boilers approved by the United States inspectors have been continually exploding, sending death and destruction around, the explosion of boilers in charge of the insurance companies has very rarely caused any disasters, and if one gave out, it was always proved to be caused by the most gross care-

lessness or recklessness of those in charge. Many boiler owners, therefore, have grown disgusted with the United States inspection, calling it a farce and an imposition, and the flourishing condition of the inspection and insurance companies has been the necessary result.

DR. TANNER'S GREAT FAST.

We call the attention of our readers to the full account of Dr. Tanner's world celebrated great forty days' fast to be found in the SCIENTIFIC AMERICAN SUPPLEMENT of this week, No. 244. It is from the pen of Dr. Vander Weyde, who, in his position as one of the watchers, and in his capacity as Professor of Chemistry of the U. S. Medical College, when the fast took place, had charge of the chemical and microscopic investigations, and therefore ample opportunity to collect the data required to give the complete account of this remarkable physiological experiment.

It should not be lost sight of that this case is very different from cases where a fast is held by necessity, such as being compelled by disease, by shipwreck, by being lost in a wilderness or forest, being buried in a mine, or lost in a cave. Dr. Tanner had enormous advantages over all these cases, and hence that he could indulge at once in hearty meals, as his digestive apparatus was not impaired by disease, nor his nervous system shattered by anxiety; in such cases it would be very dangerous, if not fatal, at once to indulge immediately in such abundance of food.

It is evident that Dr. Tanner had an easy time, if his fast is compared with that of any of the fasters for causes mentioned above. If he had been locked up under the threat that no food would be given him for forty days, he surely would not have stood it so well, as the mere consciousness of the constrained situation would have affected his mind, and all ease and comfort would have been at an end.

These facts were overlooked by those who from the first declared a forty days' fast an impossibility, and staked money on it. They were not well informed about actual fasts for so long a period, of which there are instances on record, or they did not believe the truth of such records. They judged only from the results of many well known constrained fasts which ended fatally within thirty, twenty, and even ten days, and were kept under unfavorable conditions, often by delicate girls of comparatively tender age and of a feeble constitution, perhaps of consumptive tendency to begin with; therefore they declared all claims of those who pretended to be able to fast as long as forty or even only thirty days as fraudulent and impossible without the deception of secretly taking food.

It must be a satisfaction to Dr. Tanner that his uprightness and honesty in regard to keeping strictly to the conditions of his self-imposed trial are now generally granted even by his former most violent opponents, who acknowledge freely that his behavior as a gentleman has proved him to be far above surreptitiously taking food while he was pretending to fast.

They have had their eyes opened to the fact that Dr. Tanner's case was very different from most other real or pretended fastings; that in him we have a man of a strong, tough, and wiry constitution, at an age between forty and fifty, which, for such a constitution, is that of the greatest resistance, a man provided with a copious layer of adipose tissue or fat around his body, and of a weight of one hundred and fifty-seven and a half pounds, which is far above the average for his height, which is rather below the medium, so that he must be classed among the small men. A tall man of that weight surely would not stand it as well. Even a tall man of greater weight would possess no advantages, as army statistics prove that large men, who may be stronger in regard to muscular power, are less strong in regard to their powers of endurance than smaller men, who, as is well proved by long experience, stand various sorts of privation and fatigue better than large men, who usually are the first to break down under each circumstances.

Dr. Tanner may not have proved that everybody can fast forty days, but if he has only proved that man can fast