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(Illustrated articles are marked with an asterisk.)

WE are gratified to announce that General M. D. Leggett, the new Commissioner of Patents, has entered upon the discharge of his duties. We have found the Commissioner a very affable gentleman, and are assured by him that he will use his utmost endeavor to bring up the business of the office; and he hopes that he may be able to have cases examined within two or three weeks after they are filed. Gen. Leggett has our best wishes for his future success, and, unless we mistake his character, he will avoid falling into the hands of the lobby clique, who usually attempt to worm themselves into the confidence of every new Commissioner, as soon as he gets into his seat. It has been recently charged, in the press of this city, that favoritism ruled in certain departments of the office. This inference was unjust to ex-Commissioner Fisher, and we believe that the officers, as a body, are high-toned, honorable men; but the Bible maxim, which urges us to avoid the very appearance of evil, is a safe one to practice.

PRACTICAL INSTRUCTION IN MECHANICS AND PHYSICS.

Baron Liebig solved the problem of practical instruction in chemistry, by founding a working laboratory in Giessen, more than thirty years ago. Previous to that time, there were no schools of chemistry on the continent, and it was only in the laboratories of private teachers that students were able to acquire a practical knowledge of the science. He met with great opposition at first, and it was only by dint of great perseverance and indomitable will, that he was successful. The professors in the other departments of the University objected to the appropriation of so much money to a science which, at that time, was hardly recognized as of the first rank. They were not permitted to have assistants and servants, and a large building for their special use, and they could not see why a chemist should be more highly favored. The young professor was not to be put down, and was finally able to secure the requisite funds for the erection of the famous Giessen laboratory. The school, thus founded by Liebig, soon become renowned in all countries, and students flocked to it from every nation. The inhabitants of Giessen, in recognition of the services thus rendered to the cause of education, and as a tangible proof of their regard, presented to Liebig a handsome residence in the city; and the Duke of Hesse ennobled him with the rank of Baron.

The foundation of this school was to chemistry what the establishment of the dissecting room was to anatomy. It is now difficult to conceive of there ever having been a time when chemistry was actually studied without apparatus or experiments; but such is the fact, and it is not necessary to go very far back to find that benighted period. The illustrious example set by Liebig has been followed in all countries, and everywhere laboratories for chemistry have sprung up, and an army of men have been at work making the discoveries which have been of such importance to mankind.

But how does the case stand with reference to physics? Where are the laboratories for practical instruction in this most important branch of knowledge? Where can the student go for practical instruction in the laws of light, magnetism, heat, sound, electricity, and mechanics? It is true that some of the practice in light he can learn from the photographer; and magnetism may be practically unfolded in the office of the telegraph company. The laws of heat are so poorly understood that most of this force is wasted in attempts to apply it; and sound gives a very faint report for itself in the curriculum of the student. The truth is, we need a Liebig in physics, some one who will found a school where heat, light, electricity, and sound, can be studied, just as the chemist acquires a knowledge of the properties of matter by handling it in his laboratory. Some of our most illustrious physicists have shrunk from making the attempt, as they have been too much absorbed in their own researches, and have not felt that they could spare the time. Perhaps it is well that Arago, Oersted, Faraday, and Ohm, were not interrupted in their studies and discoveries by the necessity of giving instruction to a class of students; and yet it may be queried if they could not have accomplished more by the aid of skillful assistants, just as Liebig, Woehler, and Bunsen, have done in chemistry. However this may be, it is with great satisfaction that we observe a movement in England and this country, to establish schools for practical instruction in physics. At Manchester, in England, Professor Stewart is to have a completely appointed laboratory, where the classes can acquire practical knowledge of the use of instruments, where they can perform all the common experiments in physics, and learn how to make original investigations. In fact, the same principles that have been found to apply so well in chemistry, will here be tried and modified as experience may dictate to be necessary.

The same thing is to be done in London. Already at King's College, two large rooms, adjoining the Museum of Physical Apparatus, are fitted up for a physical laboratory; and a third room has been built for the battery and supplies. "Fixed tables in both large rooms are supplied with water and gas, and with pipes passing to gasholders containing oxygen and hydrogen; also with thick copper wires, insulated with one another, passing to the battery room, so that, in electrical work, the fumes from batteries are entirely got rid of.

"The principal instruments have their fixed places on the tables, and a description of the measurement to be made is given to each student; and, while in progress, his work is examined by the professor or demonstrator. The course of study includes the subjects of pneumatics, heat, light, electricity, and magnetism; and with the regular class a definite order, in each subject, is kept to, as nearly as possible. When, as has sometimes been the case, there are twelve or more students beginning their laboratory course at the same time, it is necessary to deviate from the regular routine, and to set some to begin with heat, some with light, and others with electricity. For some experiments, such as the determination of the relation between the pressure and volume of a gas, or the measurement of the expansion of a gas for given changes of temperature, requiring the use of the manometer and cathetometer, it is found better to have two students working together, each student making in his turn, and so checking every part of, the measurement or determination."

A somewhat similar plan to the above has been adopted by Professor Pickering, of the Institute of Technology, Boston; and the results everywhere are pronouced to be of the most encouraging character. We see no reason why a school of physics may not be established in every institution where there is adequate room and sufficient capital to bear the expense. Without handling the instruments, students obtain very indefinite notions of the subjects; and as it would now be regarded as absurd to teach anatomy without dissection, or chemistry without a laboratory, so it ought to be pronounced as equally irrational to study physics without practical demonstration.

INSPECTION OF STEAM BOILERS IN OHIO.

We have been favored with a copy of an excellent bill introduced in the Legislature of the State of Ohio, by the Hon. T. J. Haldeman. The bill requires the Governor to appoint a theoretical and practical engineer as a supervising inspector, to hold his office for three years unless removed for cause.

The supervising inspector is to appoint a local inspector for each Congressional district in the State, and the local inspector, so appointed, is to be a thoroughly competent theoretical and practical engineer, removable by the supervisory inspector for incompetency or other sufficient cause. The local inspectors are to be furnished with blank certificates of inspection, and with necessary apparatus (at the expense of the State) by the supervising inspector, who is required to keep a record of all inspections of steam boilers as reported to him by the local inspectors.

Within thirty days after the passage of the act, any person, owning or controlling a boiler in use in the State, is required to give notice of the location thereof to the local inspector of the district, and the inspector, as soon as practicable, must proceed to inspect and test the same. He shall prescribe a limit of steam pressure, and shall give a certificate of such inspection and limit of pressure to the owner of the boiler. The limit desired by the owner shall be the one certified, if safe, and the hydrostatic test is not to be—unless consented to by the owners—more than one fourth greater than the working pressure allowed.

The local inspector must satisfy himself that the boiler is of good material and substantially constructed, and of proper proportions in all its parts. He is also to see that the safety valve is well arranged, in good working order, and of the dimensions prescribed by the act, which also prescribes minutely the location and arrangement of gage cocks, and the attachment of steam and water gages. But the owner is allowed, if he prefers it, to attach, instead of the water gage, a low-water indicator.

The inspectors may pass safety valves on boilers now in use, if satisfied that such valves are of sufficient size; but upon all boilers hereafter constructed, the diameters of the safety valve must be not less than two inches for one boiler; three inches for a battery of two boilers; three and a half inches for a battery of three boilers; for a battery of four boilers, a valve, on each outside boiler, of not less than three inches; for a battery of five boilers, a valve, on each outside boiler, of not less than four and a half inches; and on a battery of six or more boilers, a valve, on each outside boiler, of not less than five inches, and no spring-loaded piston or balance valve is allowed except on locomotive boilers.

This rating of the size of safety valves, in proportion to the number of boilers instead of their capacity for steam production, is defective. Mr. Haldeman should reconsider this feature of the bill.

One hundred and ten pounds to the square inch is fixed as the maximum pressure allowed as a working power for a new boiler forty-two inches in diameter, and of the proper construction and material, and with plates at least one fourth of an inch thick; and the working power of all high-pressure boilers is to be rated according to their strength, compared with this standard. In high-pressure flue boilers, flues of sixteen inches diameter are to have a thickness of no less than a quarter of an inch, and in that proportion of strength for flues of a greater or less diameter. If, on inspection, the local inspector approve the boiler, he is required to make a complete record of the test and inspection, with a minute and particular description of the boiler, and of the dimensions, proportions, and conditions of every important part and appliance thereof, and to certify that the boiler and its appliances are safe, a copy of which record and a certificate is to be given the owner or controller of the boiler.

The bill also provides for the inspection of, and granting to, persons placed in charge of boilers, certificates of qualification, and imposes a penalty of ten dollars for each day they attend a boiler without such certificate.

It requires manufacturers of boiler iron to stamp their plates, at two diagonal corners and in the center of the plate with the letter C for charcoal iron not hammered before rolling; P for puddled iron, and C H for charcoal iron hammered before rolling, together with the name of the manufacturer, and numbers indicating the quality of the iron And it also imposes a penalty upon manufacturers of boilers who shall use iron not so stamped, for boiler making. If steel plates are used they must be marked steel, and possess a tensile strength equal to that of charcoal hammered plates.

These are the general features of the proposed law; but there are many details omitted in our summary. In short, the bill is extremely minute in its requirements, but we think not too much so to be effective. It will repay a careful reading by those who are interested in perfecting systems of boiler inspection.

PROGRESS OF THE DARIEN SHIP CANAL.

A year ago we illustrated the route, for a canal across the Isthmus of Darien, which the experience of many explorers up to that time had indicated as the one preferable to all others. As the readers of our paper are aware, the final result of Com. Selfridge's exploration of the San Blas route was against its adoption. Now the same officer is examining carefully the proposed line of the Atrato river, and at the same time Com. Shufeldt is making a survey of the route across the Tehuantepec Peninsula. The route alongside the Panama Railroad seems to have been passed by, because of the poor harbors on both sides.

The Tehuantepec route, with all its disadvantages, has many earnest advocates; yet it would hardly seem probable that a canal which even its best friends admit must have at least 25 locks, can be adopted as the great highway of nations. There is, too, a doubt as to the supply of water for lockage, which the present survey will either confirm or dispel.

The route *viâ* the Atrato River has been many times reconnoitred, but never in the exact locality where Com. Selfridge is running his line. Trautwine went up to its very source, and passed over the "divide" in a distance of a few hundred yards, and at no great elevation; but that route was utterly impracticable. He again struck an air line from the mouth of the Napipi to Kelly's Bay, a fine harbor on the Pacific, and he estimated the cost of the canal at $225,000,000. This route was still later surveyed by a Government corps with the same result.

The route now taken by Com. Selfridge is one indicated by Trautwine, as probably affording a better route than those directly surveyed by him. It enters one of the northern mouths of the Atrato, goes into the main stream, then up the Cascarica river, which flows from the northwest into the Atrato. Leaving this, it strikes the waters of the Tuyara on the Pacific side, passing over an elevation of not more than 300 feet. The Tuyara is navigable for large vessels for 40 miles from the Pacific ocean, while on the Atlantic side, good river navigation extends up from the Gulf of Darien for 45 miles. Between these points is about 30 miles, the greater part of which will be deepening of the Tuyara river. The Gulf of San Miguel on the Pacific, and that of Darien on the Atlantic, are excellent harbors, land-locked, and having great depth of water. The Gulf of San Miguel is the same terminus as indicated for the route from Caledonia Bay, which we illustrated last year. This is a *resumé* of the latest information from the Darien Expedition. Accurate surveys may alter these conclusions, and it may yet be determined to use the Panama route, even with expensive docks, or making an artificial harbor, as at Port Said.

THE material interests of Bellaire, Ohio, are greatly prospering, in consequence of the union of capital, in the nail mills, factories, glass houses, and agricultural works, which are not afflicted with strikes. Nearly all the operatives are personally interested in the welfare of the concern they work for; hence their whole aim is to render it successful.