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Contents:

(Illustrations are indicated by an Asterisk.)

THE SUPERHEATED THEORY TESTED BY EXPERIMENT.

The theory that boiler explosions are caused by the introduction of water into superheated steam was discussed on page 329 of our current volume, and we showed that the surplus heat in the steam would not be sufficient to evaporate enough water to fill its own volume with saturated steam, and thus to keep up the pressure—much less to increase it so greatly as to produce an explosion.

We are informed by Mr. Albert Hussey, the engineer at Hecker's mills, in this city, that two years ago he tried the experiment of injecting water into highly superheated steam, and that the effect was to reduce the pressure.

Meeting in some work the theory of boiler explosions discussed in our article on page 329, he saw that if it was sound he could arrange to inject water into superheated steam, and thus obtain a high pressure with a small consumption of fuel. He was running an engine that was supplied by three boilers, and he prepared for his experiment a small boiler, one foot in diameter and two feet long, having it well jacketed with felt. He then led a small pipe from the steam space of one of his large boilers, and passed it several times back and forth through his furnace so that it was bathed in the flame, and then conducted it to his small boiler. The pipe became red-hot, and the steam passed through more than fifty feet of this red-hot pipe before it entered the small boiler. Mr. Hussey connected a pressure gage with the small boiler and formed a pressure of 60 pounds to the inch—of course the same as the large boiler. He also attempted to measure the temperature, but the mercury in his thermometer was evaporated the instant he brought it in contact with the hot steam.

He now, by means of a small force pump, injected a minute quantity of cold water, through a pipe arranged for the purpose, into the small boiler, and the gage immediately fell about five pounds. He then arranged his connection with the pump so as to inject hot water from the large boiler into his experimental boiler, and the result was the same—the gage went down five pounds.

All sound theory must be founded on facts, and must of course agree with all other facts. Before we published our calculation of the effect which would be produced by injecting hot water into superheated steam, we were satisfied of its correctness, but it is gratifying to find it confirmed by an experiment to direct and conclusive as that of Mr. Hussey's. The theory of boiler explosions from the mixing of water with superheated steam may be regarded as settled.

CHEAP TOOLS.

A low-priced tool is not always a cheap one, and it is better, as a general rule, to pay a fair price for a good article than to stock a shop with machines that require large annual investments for repairs. At the very time they are most wanted it is probable that some derangement renders them useless, and if not an annoyance in this respect they always have chronic defects from faulty arrangement, defective fitting of the important parts, and the inferior material used.

A good tool is well worth its price; but this is not to say that any value may be set upon one. One instance occurred to us the other day which showed that the cost of a machine is not always a test of its value. We passed a machine agency and had the curiosity to inquire what a small slide-rest engine lathe was sold for; the reply was $320. When we add that the shears were about four feet long, and the whole affair badly worn, the modesty of the dealer may be imagined; it certainly cannot be described. Another lathe, about eight feet long in the shears and capable of swinging 20 inches, was valued at only $850. The same machines, perfectly new, could be bought for $150 and $300, in ordinary times.

There are no better lathes, planing machines, etc., in the world, than those made by the best firms in this country. In point of convenience, durability, and even elegance, they surpass the best tools made abroad. In price they are incomparably lower. The English tools are excellent, as are also those made in Scotland, but they are much heavier and have not the same little extras in the way of expediting the work that our own have. The character of the work on our tools, in general, is very high; the leading screws of the lathes are accurately cut, the slide rests well fitted, the cone pulleys properly balanced and fitted to steel spindles. The bearings of the planer beds are wider and stronger than they used to be, and the uprights made much stiffer; this is also true of the cross-head carrying the tool post.

In no way can the economy of the machine shop be practiced better than in buying and making first-class tools and putting first-class men to work them.

DEPARTMENT OF AGRICULTURE.

On the 15th of May, 1862, the President of the United States approved an Act of Congress establishing a Department of Agriculture. The Act states that the designs and duties of the Department "shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants."

Isaac Newton, Esq., was appointed Commissioner of Agriculture, under this law, and his report for 1862—the first yet printed—is now before us. It is a volume of 632 pages, 120,000 copies of which were directed to be printed by a resolution of the House of Representatives adopted March 3d, 1863—14 months ago. Public printing, like everything else undertaken by Government, is done in a very slow and clumsy way. This is the case with all governments.

This volume is filled with very valuable matter for farmers and all agriculturists. It supersedes the usual agricultural reports of the Commissioner of Patents, and, like those reports, it is mostly made up of articles on various subjects by writers scattered over the country. We shall publish copious extracts as fast as we can make room for them, and would suggest to such of our subscribers as are interested in agriculture to apply to their representative in Congress for a copy of the book. All members have a large number at their disposal and the privilege of franking them through the mails, and it is proper for any person desiring a copy that he should write to the Member of Congress from his district for one.

ONE of our English exchanges received recently contained the following announcement:—"Anthony Trollope, Esq., lately delivered a lecture to the *common people* of this town," etc. The "common people" were working-men. We suppose the lecturer was one of the uncommon order.

THE ROGERS' LOCOMOTIVE WORKS.

We made a flying trip to Paterson, N. J., last week, and improved the opportunity while there to go through the celebrated shops of the "Rogers' locomotive and machine works," whose engines for the last twenty years have been sent to all quarters of the globe. The beauty, efficiency and economy of them are so well known that it is needless to dilate here upon these qualities, and we shall only remark upon a few salient points that struck us in making our rounds.

The professional observer is at once impressed with the good quality of the work done. We took the liberty to scrutinize the most important parts very closely, especially the holes in the frames where parts were bolted on, the fittings of the slide bars, the valve faces, the proportions of the steam ports, the bore of the cylinders, as well also the material of which these several parts were constructed, and as we remarked previously, no laudation on our part can improve or alter the character of them—they are first class. The bolt holes are rimmed and the bolts carefully fitted, so tight as to require a two handed hammer to drive them in, and by a new method of construction some of the frames are welded where previously they were held only by bolts. In its general features the locomotive of to-day differs but little from that made five years ago. We say this advisedly, in its *general* features, but there are many details which although small in themselves, go far in the aggregate to enhance the value of the locomotive as a piece of mechanism. Of these minor features the Rogers' locomotive has a great many; doubtless those built in the other Paterson shops—Messrs. Danforth, Cooke & Co., and the New Jersey Locomotive Works—are equally well fitted, but we speak only of what we saw, and had our engagements permitted, we should have been pleased to go through the works just mentioned.

Mr. W. S. Hudson, superintendent of the Rogers' Works, went up in the cab of a new engine with us, and pointed out some of the fixtures we have touched upon; one of which was an arrangement of the handle communicating with the cock or the pipe which leads from the feed-pump to the tender tank. This was placed close by the gages so that without turning to the rear, as in old engines, the fireman or engineer could regulate the feed to a nicety. The safety valves were also attached to a simple apparatus in such a manner that by shifting a notched rod the pressure could be taken off the spring balances in a moment. When coming up to a station it is necessary to ease up the balances and this is generally done by slacking off the nut upon them, which is not only tedious but an injudicious plan, by the use of the arrangement mentioned a great deal of labor is saved. The door forward, which the engineer looks out of, had also a simple attachment consisting of a short iron bar fastened to it; said bar working through a slotted bolt-head fixed in the framing close by in such a way that when the door was opened and set at any point, a thumb-screw would hold the bar immovable, and the door could neither rattle or slam to and fro. The blow-cocks on the cylinder were also controlled by a handle in the cab, conveniently within reach,

The Gifford injector is fitted to the engines built in these works, but not as a principal feeder of water to the boiler. The main reliance is upon the old plunger pump, and the injector is only an auxiliary to be used when standing still. Some curious facts in relation to the use of the injector on engines running in Cuba were related to us. It was stated that the water was so bad in many parts of the island that the nozzle of the injector and the working parts, so to speak, or those through which the water passed, were literally cut out as if by mechanical action. The deposit from the water was also so injurious to the boiler, that one seldom lasted longer than four years, and some engines ten years old had been furnished with three boilers in that time.

The finishing shops of the Rogers' Works occupy a great deal of ground, and as we passed through them every lathe and planer was in operation. The force at the present time is very large, and the contracts under way heavy. The drivers are forced on the main axles by hydraulic pressure, and are then turned outside as usual; one end of the axle runs on its own bearing, while the other rests on the live center of the lathe. In this way the wheel may be