How to use Steam in Engines.

In our last number we presented a brief view of the Annual Report of the Manchester (Eng.) Association for Preventing Steam Boiler Explosions. The information given related to different kinds of boilers—describing their merits and demerits. We will now refer to totally different features of that Report, respecting some of which a great variety of opinion exists among engineers.

High and Low Pressure Steam.—The Report says:—"The economy of high pressure steam is now generally admitted, but there appears to me to be much misapprehension as to the source of this economy. By many it is imagined that it is derived principally from its generation in the boiler. This opinion seems to have been formed from the observed fact, that the pressure increases in a rapidly accelerating progression—in other words, the higher the pressure the more rapid the increase. But it has been satisfactorily proved that the quantity of fuel required to evaporate a given quantity of water increases with the pressure, that is to say, it requires more fuel to evaporate a given weight of water under 60 lbs. than under 10 lbs. pressure, from which we may conclude that no economy will result from the generation of steam at an increased pressure, unless accompanied by a proper use of it in the engine."

[It is true that more heat exists in a given quantity of steam at 60 lbs. pressure than at 10 lbs., but the difference is too little to be of moment, and in general terms it may be assumed that the actual amount of fuel consumed to boil away a given quantity of water will be very nearly the same, whatever the pressure. We propose, at our first leisure, to take up the subject discussed in the following extracts, and present briefly several of our American methods of using steam to much better advantage than it would appear the English manufacturers do.—Ed.]

"Of non-condensing engines little need be said. I will only observe, in reference to these, that in order to work with the greatest economy, it is necessary so to arrange the valves that the steam will be reduced by expansion nearly to atmospheric pressure before escaping from the cylinder.

In condensing engines the steam should be cut off at such a portion of the stroke that at its termination the pressure of the steam will be reduced by expansion to 8 or 10 lbs. below that of the atmosphere, previous to passing into the condenser, otherwise the steam has not done its full work. If, therefore, it be required to expand the steam to this low pressure, say 7 lbs. total pressure, and the valve be arranged to cut off at one-fifth of the stroke, the initial pressure should be 35, or 20 lbs. above that of the atmosphere, and if 10 lbs. additional be allowed in the boiler—which is more than absolutely necessary, we have 30 lbs. per square inch, beyond which there is no advantage in raising the steam for this class of engine, cutting off at one-fifth of the stroke. We find, however, examples where the boiler pressure is nearly double this amount, while the initial pressure in the cylinder does not exceed 12 or 14 lbs. per square inch. This arises partly from the mistaken ideas above mentioned, and partly from errors in the arrangement of the valves. In order to work more expansively and economise fuel, it is usual, where slides valves are employed, to increase the lap or cover of the valve, that it may close earlier, but when this is done it is found that the engine will not drive its load, unless the boiler pressure be increased; the explanation of which is, that the additional lap on the valve has so contracted the opening of the port that the steam can only enter the cylinder at a greatly reduced pressure. By properly proportioning the lap and travel of the valve, the same result might be obtained without any increase of the boiler pressure.

Another error which I must mention is the common practice of cutting out a small piece on the steam side of the valve, in the shape of a V, the professed object of which is to admit the steam more gradually to the cylinder, and thus prevent a sudden shock to the engine in passing the centers. To some extent this effect may be produced, but there will at the same time be the disadvantage of wire-drawing the steam and admitting it to the cylinder when the valve ought to be entirely closed.

A better remedy, unaccompanied by these disadvantages, is the following:—

If the valve of an engine be so arranged as to close the exhaust port before the termination of the stroke, the steam within the cylinder must be compressed as the piston continues its course, and will increase in pressure as the space occupied is diminished. By properly proportioning the degree of compression to the initial pressure on the piston all shock in passing the centers will be obviated, and at the same time steam economized, as in this manner the steam passages and clearance will be filled with steam, which otherwise would have passed into the condenser. This mode of working is certainly contrary to the general practice of engineers, but wherever it has been adopted it has given the most satisfactory results, and I feel persuaded its adoption must eventally become general, as nothing will more effectually prevent those accidents to engines, of which we have so many examples. Within the last twelve months not fewer than fifteen of the engines under our inspection have broken down, which, forming my opinion principally from the indicator diagrams, I have reason to believe would have been obviated by attention to the principle just explained. These remarks on the arrangement of the valves apply equally to engines working compound. This system of working, which has of late been brought much into use, is found in some instances to give very satisfactory results, and where additional power is required, is frequently the most convenient mode of obtaining it, but in comparing the best engines of each system, there does not appear that decided superiority in economy in compound engines which might have been anticipated from the greater pressure of steam. In seeking for the reason of this, we cannot have better evidence than that given by the indicator diagrams, which show that in all engines working compound there is a loss of pressure, as the steam passes from the high to the low pressure cylinder, the amount varying according to the arrangement of the valves and the capacity of the passages of communication.

One example I may mention where the steam, leaving the high pressure cylinder at 53 lbs., is reduced, by expansion in the steam passages, to 11 lbs. pressure before entering the low pressure cylinder. What is chiefly required to improve the condensing engine, and make it equal in economy to the compound engine, is a simple variable expansion motion capable of regulating the supply of steam according to the load, without any reduction in the initial pressure—an evil to which most engines are now subjected by the action of the throttle valve. The present valve motions which have this for their object appear to be too complicated to be brought into general use."

The Transatlantic Telegraph Bill.

Our government extends its aid to the great Telegraph, and secures its share of the benefits thence derivable, by the following Act, which became a law on the 26th of February, Great Britain having already provided for a similar contract:

AN ACT to Expedite Telegraphic Communication for the use of the Government in its foreign intercourse.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of State, in the discretion and under the direction of the President of the United States, may contract with any competent person, persons, or association, for the aid of the United States, by furnishing not exceeding two ships, in laying down a submarine cable, to connect existing telegraphs between the coast of Newfoundland and the coast of Ireland, and for the use of such submarine communication when established by the Government of the United States, on such terms and conditions as shall seem to the President just and reasonable, not exceeding $70,000 per annum, until the net profit of such person, persons, or association shall be equal to a dividend of six per cent. per annum, and then not exceeding $50,000 per annum, for twenty-five years. *Provided*, That the Government of Great Britain shall, before or at the same time, enter into a like contract for those purposes, with the same person, persons, or association, and upon terms of exact equality with those stipulated by the United States. *And provided*, That the tariff of prices for the use of such submarine communication by the public shall be fixed by the Secretary of the Treasury of the United States and the Government of Great Britain, or its authorized agent: *Provided further*, That the United States and the citizens thereof shall enjoy the use of said Submarine Telegraph communication for all time, on the same terms and conditions which shall be stipulated in favor of the Government of Great Britain and the subjects ther eof, recognizing equality of rights among the citizens of the United States in the use of said submarine communication and the lines of telegraph which may, at any time, connect with the same or its terminus upon the coast of Newfoundland and in the United States, in any contract, so to be entered into by such person, persons, or association with that Government; *Provided further*, That the contract to be made by the British Government shall not be different from that already proposed by the Government to the New York, Newfoundland, and London Telegraph Company, except such provisions as may be necessary to secure to each Government the transmission of its own messages by its own agents. *And provided further*, That it shall be in the power of Congress, after ten years, to terminate said contact upon giving one year's notice to the parties to such contract.

Tempering Mill Picks.

Messrs. Editors—I perceive that W. L. Colburn, through the columns of the Scientific American, wishes to find out how to produce a good temper in mill picks. Twenty-one years in the millwright business qualifies me to give the following good recipe:—

To 1 gallon of water add 1 handful of common salt, 4 teaspoonfulls of alum, and 2 of saltpetre. Heat the picks to a cherry red, drop them into this solution, and the tempering is done. G. S.

Tempering Mill Picks.

Messrs. Editors—Having seen a communication calling for information respecting the best manner of hardening mill picks, I thought I would send you my experience in that line of business. My father formerly owned a grist mill, and I will describe the process as he taught it to me. Use the best cast steel; do not heat it above a cherry red for hammering, and in no case must it be welded with borax; the lower the pick is heated the better. Hammer the points till the steel is well settled together and compact, and then file the ends sharp. Put the end of one on the fire, till it acquires a low red heat, when it must be taken out and dipped into water. Go through the same process with the others. After tempering do not anneal them. Picks hardened in this way will stand the best burr mill stones. B. B.

New Russia, N. Y., March, 1857.

[These two methods are not essentially different, and may both be of service, that is, use all the care in working required by B B., and then harden in the water prepared by G. S. The precise nature of the change in the structure of steel in the process of hardening is unknown, but it is induced by the simple process of rapid cooling, however this end may be obtained. It is well known that file makers and others wishing to make steel very hard, prepare their water by some materials or processes which they affect to keep very secret; and all steel-workers are familiar with the fact that salt makes water bite sharper and cools the metal faster—in other words, produces a better hardening medium. It is very possible that the alum-filled pickle is the best fluid in the world for the purpose. The annexed, received after the above was in type, also conveys good suggestions.]

Messrs. Editors—I will give the results of my experience. Blacksmiths generally heat the pick too hot, and harden it too much, and then draw the temper. In this way they generally make it either too hard or too soft. For several years past I have been in the habit of sharpening or tempering for myself. I go upon the principle that the lower the heat is when the pick is hardened in the water, the better, provided it becomes hard enough to stand. After the pick is sharpened, and the edge smoothed off with a file, heat the edge back a quarter of an inch, barely to a cherry red, and then put it into cool water. It will then be ready for use. I think a little experience will enable any mechanic to temper them right, so that they will stand to work on French burr. If they are hardened too far up from the edge they are apt to break or fly off. If they are no harder than common edge-tools they will not do so. Every miller, especially in the country, should have a small forge and bellows. A. G. F.

Quincy, Ill., Feb., 1857.

Cast Iron Sleepers.—Justice.

On page 126, this Vol., we quoted an article from the Lancaster (Pa.) *Express*, in reference to the application made for a patent, about eight years ago, by P. Getz, of that place, for an improvement in cast iron sleepers for railroads. The *Express* published what purported to be the letter of rejection in that case, which letter we copied, and stated that it did not comply with the provisions of the patent law. It was as follows:—

Sir—Your application for Letters Patent for alleged improvements in the chairs, blocks, &c., of railroads, has been examined, and rejected for want of novelty. (Signed)

Edmund Burke,
Commissioner.

Mr. Peter Getz.

We have received a letter from Washington in which positive proof is given that the above letter of rejection, published by the *Express*, has done injustice to the Examiner who rejected the application. The following part of the letter after the word *novelty*, was left out:—

"For the cast iron cross tie and chain in one piece, see Tredgold on Railways, plate 2, fig. 7. For the cast-block, with chain attached, cast iron cross-ties, &c., see Repertory of Arts, Vol. 9, plate 16, lines 4, &c. For terms of appeal and withdrawal you are referred to the enclosed circular."

This is from a copy of the rejected letter, and we must say the references are very fair. The *Express* should have published the entire letter.

Position of Posts.

Posts set in earth, particularly in loose sandy soil which allows the air to penetrate, are apt to decay very rapidly. Inverting the position so that the sticks stand 't'other side up with care" has long been known as inducing a considerably increased endurance, and has been often published, but never yet sufficiently introduced into practice. A correspondent of the *Ohio Farmer* gives the following facts in his experience, which may be of value:—

"I put up, in the fall of 1844, some post and board fence. The posts, which were oak, were cut in January, sawed two by three inches at the top, and two by six at the butt. I put them in the ground inverted from the way they grew, and packed with limestone. They are good and sound now. Posts of the same timber, set at the same time, packed with dirt, and without being inverted, are three-fourths rotted and worthless. I am now renewing my fences, with inverted posts, and packing with limestone, at an addional cost of ten cents per panel; and I am sure that in fifteen years the increased cost over the ordinary fence will be saved by this method."

Hard Times.

The peace of the great European nations does not appear to be followed by any increase of prosperity in the industrial interests, but rather the reverse. Much of the work on arms and equipment was, of course, immediately suspended on the confirmation of the peace, and we have already alluded to the fact that the war vessels under construction are temporarily abandoned, and the small vessels afloat are being hauled up, to diminish the expense of sustaining them. Many men are necessarily thrown out of employ, and a meeting of between five and ten thousand of the laboring classes of London was lately held, to consider their distressed condition. It was stated that 25,000 persons engaged in the building trade alone in that city are out of work, and that the total number of unemployed persons in that great metropolis would probably reach a quarter of a million.

The state of things in London must be similar to or perhaps worse than that in this city two winters ago. At present we are happy in being able to say that a very satisfactory state of things obtains in regard to labor. Although the cost of living seems to increase every quarter, business is active, wages good, and all who are willing to work and apply themselves, mind and hands to their business, can secure a good living and accumulate something.