lathes, etc. We give below a copy of the protest lately sent by them to each of the seventy-one Senators in Congress; we advise all other manufacturers to speak out strongly at this juncture, and let the Senate promptly hear from them.

SENATORIAL PROTEST OF THE JARVIS ENGINEERING CO.

DEAR SIR: We wish, most respectfully, to protest against the House bill No. 3,617, in regard to reducing the life of a patent from seventeen years to five years. We are doing business under patents issued to Mr. Kingsbury M. Jarvis in the year 1876, and it took us over five years to get them introduced and put on a paying basis; this was only accomplished after sinking a large amount of money and doing the hardest kind of work.

We wish, also, to protest against Senate bill No. 1,588, as we feel that, if it passes, inventors and owners of patents will have no protection. We have spent thousands of dollars in defense of our patents, and, under this law, all our labor and expense will have been thrown away.

Yours respectfully,
JARVIS ENGINEERING CO.,
A. F. UPTON,
Treasurer and General Manager.

Boston, April 4, 1884.

IMPROVEMENTS IN MEN AND MACHINES.

It would be a curious study to ascertain how far the improvement in machines and in tools had kept pace with that in the skilled mechanic. One thing is certain, at the beginning of the inquiry, that a skilled mechanic is of just as much value to-day as ever. How much he has improved is a question for scientific examination rather than one for absolute statement. It would be a queer assertion that the men of fifty years ago were inferior to those of the present. All the facts of the past, as well as those of the present, show that our present mechanics are no more mechanics than those of half a century ago. All the great improvements in hand tools and machine tools for the last fifty years have come from the individual efforts of men who had done their work before the present advent of machine and automatic tools. These men—these workmen and inventors—made possibilities out of suggestions, and realities out of imaginings. To them belong the realities of the present machine shop.

It would seem from this that it is not the tools and the appliances that make the workmen, but the workmen who make the tools. There are just as good mechanics to-day, with all our mechanical appliances for good work, as there were when every job required a new arrangement of tools for work. In fact, the improvement in machines presupposes the capacity of the machine makers.

And yet these improvements have their influence on the workman; the better the tool, the more exactive the workman. There are gray headed, almost superannuated, workmen in our shops who have voluntarily discarded all their old time notions to take up with some "new fangled trick" that has been proved to be an advance toward perfection. Every improvement in tools—induced and perfected by mechanics—tends to an advance in the true mechanical improvement of the workman.

AMERICAN STANDARD FOR BOILERS.

"The American standard for horse power, as generated in steam boilers, is described by the SCIENTIFIC AMERICAN as the unit of 30 pounds of water evaporated hourly. This datum applies to the boiler only, and is irrespective of the engine by which the steam is utilized. The Committee of the Centennial Exhibition of 1876, to whom was referred the testing of steam engines and boilers, first formulated this unit in calculating the power of boilers, and their determination has since been generally accepted by American engineers. Hence the nominal horse power of a boiler is ascertained in use, without reference to heating surface, by observing the weight of water evaporated hourly, and dividing by 30. It has been found that the best class of engines, in good working order, will give 1 horse power from the steam of 18 pounds of water per hour, or less. On the other hand, badly constructed engines, out of order, have consumed as much as 60 pounds of water, in the shape of steam, per horse power per hour. The weight of the fuel consumed in steam generation is a product of the combined excellences and defects of engine and boiler. A good boiler will evaporate 11 or 12 pounds of water per pound of coal, which is equivalent to the production of the standard unit of horse power with as little as 2½ pounds of coal per hour. On the other hand, many boilers scarcely evaporate 5 pounds of water per pound of coal. Combining the best qualities and performances of both engines and boilers as given by the American writer, it will be seen that 2½ pounds of coal should evaporate 30 pounds of water, which should produce nearly 2 horse power in the engine, or a net result of little more than 1¼ pounds of coal per horse power per hour. It might be interesting to learn when, and under what conditions, any such record of a working performance was ever obtained."—*Journal of Gas Lighting.*

While we approve the general tenor of the above criticism, we would call the attention of the writer to the clause, "The weight of fuel consumed in steam *generation* is a product of the combined excellences and defects of *engine* and boiler."

Here appears to us a slight error: The weight of fuel consumed in steam *generation* depends upon the excellences and defects of the boiler *only*; the character or condition of the engine by which the steam is used or *consumed* has nothing whatever to do with the *generation*; even if the steam was blown off by the safety valve, it would have no bearing or effect upon the question of economical generation.

The writer, by assuming what maybe considered the very best of boilers as generators, and the very best of engines as consumers of steam, arrives at the result of one horse power for 1¼ pounds coal per hour, and asks if such result was ever obtained. Now, if he will examine closely results obtained at test trials, where everything is supposed to be in best adjustment and condition to secure economy, he will find that this economy of 1¼ pounds coal (or within a small fraction of it) per horse power per hour has been accomplished.

We do not, however, pretend to claim that this economy has been frequently attained, even in careful tests for economy; average results of every-day practice are much more wide of such result.

Now, the writer has assumed the very best condition of boiler and engine in the calculation given above; but let us take the case of *good* every-day practice, and we assume 8 pounds water evaporated per pound of coal, which is fully up to average evaporation. Then 30 pounds water will require 3¾ pounds coal per horse power per hour, assuming that 30 pounds are required by the engine, which we think is rather below than above the average of engines now in use. But if we allow that only 24 pounds per hour are required by the engine, then the consumption of coal will be 2½ pounds per horse power per hour, which is not a very uncommon result with compound engines.

SUGGESTIONS FOR INVENTORS.

There are many inventive minds that are comparatively idle for the reason that the wants of the people are not thoroughly understood. In order that inventors may get an idea of what is needed in the way of improvements, and that would be tolerably certain to bring a reasonable reward to the inventor, a brief mention will be made of a few needed improvements in railway appliances.

The numerous and frequent accidents and delays to railway trains on account of snow, point to the fact that better appliances for removing snow and ice are needed, and now is the time for observation and experiment. The man who will bring out an improved snow plow and flange clearer will be well paid for his labor.

Accidents from broken parallel rods are becoming more frequent than formerly, and an improved construction of that overworked and abused part of a locomotive is called for. But in order to be successful in designing an improved parallel rod it is necessary to study the nature of the various strains, jars, shocks, and vibrations—lateral, centrifugal, and otherwise—to which the rod is subjected. Owing to the peculiar duties the rod has to perform, it is desirable that its strength be increased as much as possible without a corresponding increase in weight.

Notwithstanding the fact that our railway lines have adopted the most approved signal appliances for the safe running of trains, collisions are yet too frequent, and something reliable in this line is needed. Some of the systems now in use are reliable when in good order, but their liability to derangement renders them dangerous, and there is room for improvements in this direction. Many disastrous collisions are caused by defective drawtackle. Pins and links break and draw bars pull out, and trains breaking in two is a fruitful source of disaster. Better fastenings for draw bars, and links made of wire cable by some process yet to be discovered, would yield a fortune to the inventor. It would not seem to be a difficult matter to make a machine that would convert wire into links by a winding and welding process; that is, make a wire link. The nut lock men have not yet succeeded in producing a perfect lock. There are those that will give satisfaction in certain places, as in agricultural machinery, carriages, etc., but no satisfactory lock has yet been devised for track fixtures. As the safety of railway travel depends largely on the condition of the rail joints, a more efficient nut lock is among the wants of railway officers.

A great many serious railway disasters have resulted from the spreading of rails. On roads of heavy traffic the ordinary spikes are inadequate to resist the strain imposed upon them, and the plan of double spiking is objectionable on account of injury to the cross ties. Moreover, the extra spikes do not always prevent spreading, and a "rail brace" is sought for. This must be so formed that a single spike passing through the brace will give greater resistance to strains than two, or even three, ordinary spikes driven in the ordinary way. This is not impossible, and the manner in which it may be accomplished may not be regarded as a conundrum by any one who will give the matter a little thought.

Timber for railway ties is rapidly growing scarce, and the time is now at hand to cast about for a substitute for wood for this purpose. Indeed, inventors are already in the field with various plans of relief for the coming want. Glass has been suggested and tried in Europe. Cast and wrought iron have been used with some degree of satisfaction in countries where frost was not injurious to those materials, and a combination of wood and iron may be made a comparatively cheap and desirable substitute for wood for cross ties in any climate. Straw and sawdust can be made to do duty as wood cut from the tree for many purposes. In cutting ties from timber it is necessary that the trees be of suitable size. There is a vast amount of small, crooked, gnarled timber that is entirely unsuited to the manufacture of ties. Perhaps, by some process yet to be invented, this timber may be utilized and brought in shape for ties and other purposes. Perhaps other waste material may be utilized for this purpose. A combination of materials that are now regarded as waste or "in the way" may, perhaps, be made valuable by study on the part of inventors. In producing a substitute for wood for ties the inventor must not lose sight of the fact that a certain amount of elasticity must be provided for. There is a bonanza for the inventor of the coming railway cross tie.

Accidents at crossings are yet numerous, notwithstanding all that has been done to prevent this class of horrors. The proper place for an alarm is at the crossing, and it must be so located that it will be sure to warn people in time for them to avoid collision. There are some automatic alarms in use, but, like other automatic appliances, are susceptible of improvement. In short, there is hardly any safety railway appliance but may be improved, and inventors who are seeking for profitable fields of labor will do well to investigate the causes of railway accidents and devise means of greater safety to life, limb, and property.

The foregoing will indicate the direction in which inventors may work with profit, and although the ground in the main has been worked over, there is yet room for valuable improvements. With many inventors it is as difficult to know what to invent as it is to perfect the device when once in hand. "What shall I invent?" is a question often asked by prolific inventors who are equal to any task set for them, but who are at a loss for ideas to start them in the right direction.

THE CHEAPNESS OF COST.

The time has gone by when cheapness was considered one of the good qualities of tools. Fussy finish also, that indicates nothing but the idle fancy of the tool fashioner, is held as slightly in favor by mechanics. The main object in the production, the choice, and the use of tools is to make, select and use the best, with much less regard to cost or price than to absolute value and useful life.

This unquestionably has improved the quality of the resultant work, and within twenty-five years this improvement has been so great as to attract the attention of those who are merely casual observers. Such fits, and accuracy, and exact results as are common now, but would have been deemed almost impossible twenty-five years ago, have been brought about largely by the use of accurate and costly tools. Adjustable and interchangeable lathe and planer tools are steadily taking the place of the forge-fashioned bars of steel although costing very much more at first. The bits or cutting portion of these tools are forged and milled accurately and finished to exactness. Some of them are threaded for adjustment; some are carefully milled to unequal sides, so that a cross section would be a trapezium instead of a square or a diamond, and some are accurately termed disks fitted and finished by gauge. But with all their cost of labor and price of money they do the work so much better, last so much longer, and require so much less attention that their cost is cheapness.

Not many years ago the tap wrench was scarcely dignified by the title of tool in the shop; any bar of iron, of convenient length, with a hole punched through it somewhere between the two ends, to go over the squared top of a tap, or a reamer without turning around on the squared top, was a sufficient tap wrench. One of the most prominent builders of large machine tools and small hand tools, as taps, dies, reamers, etc., said recently that he had much difficulty in introducing a perfectly balanced tap wrench to accompany his taps; the purchasers of the taps believing that anything that would turn the tap, if nothing more than an ordinary wrench, was sufficient. Such purchasers broke a much larger proportion of hand taps than of machine taps the torsion of which is necessarily even. But a balanced and exact tap wrench in the hands of a careful workman will add vastly to the useful life of the hand tap. This view is reasonable, for in use the tap and its wrench are essentially one, and should be moved accurately and synchronously together. This exactness in the making of so simple a tool as a tap wrench is an illustration of the advance that has been made in the improvements which demonstrate the cheapness of cost.

Grief in the Dog.

Mrs. Walter Odell, of Stapleton, Staten Island, died at 3 o'clock on Tuesday morning, March 25. A Scotch terrier, Fido, had been her pet for twelve years. During the two months of her illness Fido remained beside her bed. After her death he persisted in lying beside the coffin. He followed it to the hearse, and tried to jump inside the hearse. When the procession reached the grave, Fido was there. After the funeral he took up his former position beside the bed lately occupied by Mrs. Odell. He refused to eat.

Two days ago he found a pair of shoes that formerly belonged to Mrs. Odell, but had been thrown out of doors. These he took up in his mouth and carried to his self-assigned post near the bed, and, placing the shoes on the floor, laid his fore paws and head across them, in which position he remained several hours. During Monday night, 31, he roused the household by his mournful cries. At 3 o'clock on Tuesday morning, exactly one week to an hour after Mrs. Odell's death, Fido died beside the bed, his head and paws resting on the shoes.—*N. Y. Sun.*

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