

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents for the SCIENTIFIC AMERICAN.

"The American News Company," Agents, 121 Nassau street, New York
"The New York News Company," 8 Spruce street.

Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XVIII., No. 4. . . [NEW SERIES]. . . Twenty-third Year.

NEW YORK, SATURDAY, JANUARY 25, 1868.

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HEAT POWER—ITS VALUE AND WASTE.

Our mechanics are becoming convinced that a broad field for improvement is opened to them in providing against the enormous waste of force caused by the insufficient means by which we generate motive power from heat. To this end the attempts of our inventors are directed in the various forms of steam generators, which so frequently become the subjects of patents. Heat is the best reservoir of power yet known to the mechanical or the scientific world. But the larger proportion of the heat evolved in the combustion of fuel is lost or wasted, whether that combustion is employed in generating steam for boilers or warming the atmosphere of rooms. In our best steam generators the percentage of heat force rendered available as a motive power, compared with the amount of fuel consumed, and the amount of latent heat force known to reside in the fuel, is ridiculously small. We seem to be, in regard to the utilization of the products of combustion under our steam boilers, but a trifling degree removed from the attempts of the last generation to heat their dwellings. From the old-fashioned fireplace, with its heap of wood burning at the base of a capacious chimney, which exacted the larger part of the heat, to the elegant heat-saving stoves, furnaces, and ranges, supplied with every appliance to extract the largest possible amount of heat in its passage from the fire to the outer atmosphere, is a large remove. In this direction a great deal has been done, and our dwellings are warmed and our dinners cooked with a tithe of the fuel which was required twenty-five or thirty years ago.

It may be doubted if so much progress has been made in this direction by our mechanical engineers. To be sure, there are instances where a steam generator of an improved style has shown marked advantages over those of the old make in the saving of fuel. But there is still room for much greater improvement in this direction.

The next great radical invention must be, it seems to us, something which shall enable us to use the means which nature has placed within our reach for the production of power, without letting eighty or ninety per cent of it slip through our fingers in the using. One obstacle to this is the attachment to old styles of boilers, which in the days of our fathers seldom exploded, simply because the internal pressure was but little above that of the atmosphere externally. To confine heat, or to rapidly generate heat in a reservoir, at a degree which shall render it the most effectual for the production of power, requires, not only a strong vessel (boiler), but knowledge of its powers and skill in its management. If these are wanting it is useless for inventors to exert themselves in contriving more efficient steam generators only to be blamed for the results of the carelessness of ignorant or underpaid employes who pay with their lives for the cupidity of employers. We need a steam generator which shall yield in available power at least the larger percentage of the heat employed for its production, and we believe this is within the bounds of mechanical skill and the limits of scientific knowledge.

ARE MODERN MECHANICS INFERIOR?

Not only in the social and the political world, but in the mechanical world, there are to be found many croakers, who are forever disparaging the present and praising the past—who are forever regretting the "good old times," and belittling the progress of the present. If they are directed to the progress made in the mechanic arts by the present generation, they will, at once, point to the vast improvements made in tools and labor saving machinery as the reason for that progress, without considering that these very improvements refute their statements, and render untenable their position. The saving of manual labor, the economy of time, and the

perfection of results, are the objects aimed at by our present generation of mechanics, and they deserve as much credit for their attempts and successes in this direction as those who went before them do for their surprising patience and skill in manipulation. Taking the steam engine as an example of improvement, it is useless to deny that a first class machine of the present day is not a very superior machine to the best constructed under Watt's personal supervision. The principle may be the same, the motive power and its means of generation similar, but the results are widely different. The steam engine has become an economical machine, not merely a motor which could be used advantageously only where other power could not be made available, but one that stands in the front rank for economy, facility of handling, and regularity of speed under the most rigorous tests. The improvements to which this result is due are evidences of the inventive genius, patient investigation, and constructive skill of our modern mechanics.

The machines most used in iron manufactures are also illustrations of the fidelity of our present race of mechanics to their business. All of them, without exception, and almost every hand and bench tool, have been improved so as not only to facilitate the progress of work, but to add greatly to its accuracy. The turning lathe of only twenty-five years ago would be regarded now as a relic of comparative mechanical ignorance. The "shears," or frame of timber, with the ways of cast iron, mortised in, and planed or filed by hand; the hand chaser for screw cutting, followed by the hand-worked slide rest; these contrast strangely with the elegant engine lathes which turn a shaft, bore a pulley, or cut a thread, involving changes, which, however, may be made in a moment. The upright drill for boring holes through the hubs of heavy pulleys and gears, requiring only to be seated and trued on the revolving bed and chucked as nicely as though swung in a lathe, had no counterpart in the wearisome hand labor of hand boring, equaled in its monotonousness and weariness by the convict's treadmill. The planer, obeying the will of the operator, who merely directs the work, is not much like the wearisome chipping and filing of the hard working mechanic of thirty years ago.

So we might go on citing cases innumerable to show that the mechanics of the present day are not a whit behind their predecessors in their attachment to their business and their anxiety to produce good work.

There are some virtues, however, possessed by our predecessors, we might do well to imitate. They worked in consonance with the maxim that "what was worth doing at all was worth doing well," one which, judging by some of the half finished jobs which sometimes vex the eye of the mechanic, we would do well to imitate. Another is that tenacity of purpose and patience of performance which after weeks of monotonous mechanical labor found its reward in a consciousness of a job well done. Still another is that determination to become a master of the business, by repeated and continued trials toward perfection in the use of tools, which left the mechanic master of the field.

Such a man was the late Ebenezer Winship, whose death we noticed in the closing number of the last volume. To him young mechanics resorted for instruction, especially in difficulties. His mechanical knowledge was not so much the result of his fifty years experience, as his frequent and perhaps compulsory requirement of meeting mechanical difficulties with what many present mechanics would deem insufficient means. He was a man for emergencies, and really it is in emergencies that the value and character of the true mechanic shine most brightly. These virtues, added to our superior facilities, ought to make our mechanics the equals of any who have preceded them, and examples to those who may come after.

THE "ANGOLA" ACCIDENT.

From a correspondent who signs himself "F. D. A., an employe of the Lake Shore Road," we have received a communication in which he states that it was a part of his business to make an examination into the cause of the late deplorable accident, and that contrary to our statement on page 25, No. 2, current volume, there was no broken flange on any of the wheels, but that a bent axle was the cause of the accident. He says that the engineer did not know the condition of the train, but obeyed the signals of the conductor in a proper manner. He thinks also that any safety brake, worthy the name, should be one which could be operated under the whole train at once, either by the engineer, conductor, or brakeman, as circumstances might determine, and concludes with the statement that the Lake Shore road employs as experienced and faithful inspectors as any road in the country.

To all of which we yield a hearty assent. But we did not state that a broken wheel was the cause of the accident, only that this was one of the causes assigned by others. When the article to which our correspondent refers was written the verdict of the coroner's jury that the accident was caused by a bent axle had not been rendered; that fact was published on page 41 of the succeeding issue of the SCIENTIFIC AMERICAN. We are not aware that any brake has yet been invented to act simultaneously on all the cars in a train and be operated by a person at any point on the train. We have cast no reflections on the management of the Lake Shore road; having traveled on it many times we have a high opinion of its condition and management.

Death of an Inventor.

Mr. Samuel Nicolson, inventor of the "Nicolson pavement," an improved steering apparatus for vessels, and several other inventions, died at the United States Hotel, Boston, on the 6th inst., after a brief illness, at the age of seventy-six years. He was a native of Plymouth, Mass. He held the office of

superintendent of the Milldam Corporation, and secretary of the Water Power Company, for several years; was a useful member of the Boston Common Council of 1852-3, and was truly a thorough gentleman of the old school. The pavement named after its illustrious deceased inventor is becoming so popular in our cities that his name is likely to be known to posterity, as his memory will be respected by the present generation.

REPORT OF COMMISSIONER WELLS.

The second annual report of Hon. D. A. Wells, the Special Commissioner of the Revenue, contains facts and makes some recommendations which will be found worthy of note. Mr. Wells strongly urges a reduction in the expenditures for the army and navy and in other departments of the public service, and recommends that no money be appropriated for the further purchase of foreign territory. He says:

"With the substantial adoption on the part of Congress of an economical policy as above indicated, the ordinary expenses of the government might, it is believed, be immediately reduced to one hundred and forty millions per annum, which amount would even then be an excess of over 100 per cent on the ordinary expenditures of the fiscal year 1861. With a saving of from fifty to sixty millions per annum thus effected, a reduction of taxation to an extent sufficient to afford an immediate relief and stimulus to the industrial interests of the country, becomes at once practicable; and this even on the assumption that no increase of the Internal Revenue is likely to accrue from any improvement in the method of assessing and collecting taxes, or from the progress of the country in wealth and population. Thus, for example, a reduction in the annual expenditures of the War Department from \$83,841,555, as in 1867, to sixty millions of dollars would allow a reduction of over 26 per cent on all the taxes now levied on manufactured products, exclusive of liquors, tobacco, and a few other articles generally classed under the head of luxuries, and still leave to the credit of this department for its increased necessities, growing out of a change in the circumstances of the country, a sum 260 per cent in advance of what was required in 1861. In like manner a reduction in the expenditures of the Navy Department from thirty-one millions, the requirements of the last fiscal year, to fifteen millions, would supplement all the present revenue derived from the following articles, and allow the taxes on the same to be entirely dispensed with:—All fabrics and manufactures of cotton; all manufactures of wool, including carpets and hosiery; or, all manufactures of iron and steel, including machinery, steam engines, &c.; together with hats, leather, and all manufactures of leather including boot and shoes, saddlery, harness and trunks; with paper of all kinds. Or, to put the case differently, if a reduction could be effected, of thirty millions in the expenditures of the War Department, of fifteen millions in those of the Navy Department, of fifteen millions in those of the Civil Service, with a discontinuance of any further appropriations for what may be called extraordinary expenditures, it would permit the removal, substantially, of nearly all of what are understood to be industrial taxes, and also offset the amount derived during the last fiscal year from the tax upon raw cotton.

In regard to the industrial condition of the country the Commissioner remarks that "immigration continues to flow with uninterrupted volume, at the rate of over 300,000 per annum; making a positive yearly addition to the wealth and producing capacity of the country of not less than one hundred and fifty millions of dollars: A continued increase in the invention of machinery, and the perfecting of processes for improving and cheapening products; as is more especially made evident by the returns of the Patent Office—the whole number of patents issued for the eleven months ending Dec. 3, 1867, being 10,907, as compared with 9,100 issued during the corresponding period of 1866, 6,320 for the entire year 1865, and 4,637 for the year 1864. This very remarkable increase must not, however, be accepted in its fullest apparent extent, as illustrative of substantial progress. It is so, undoubtedly, in great part; but, on the other hand, the real value of many patented improvements, as additions to the substantial wealth of the country, may well be doubted: An increase in the capital invested, and in the number and capacity of establishments for manufacturing purposes. In order to obtain some certain information on this subject, the Commissioner, at the commencement of the last calendar year, instituted measures for collecting and recording such data relative to every department of industrial progress as were available. The results thus obtained would require a volume for their publication; and, although somewhat imperfect and miscellaneous in their character, they establish, nevertheless, beyond a doubt and in a most curious and interesting manner, the fact that great and substantial progress in manufacturing industry has been achieved in nearly every section of the country.

"In the manufacture of cotton, the amount of machinery at present in the country, and which is substantially engaged in the work of production, is from 15 to 20 per cent more than existed at the beginning of the war; while the export trade in coarse cottons, formerly (before the war), large, but afterward almost entirely lost, is now recovering with gratifying rapidity. In the department of woolen industry, notwithstanding the recent unusual depression of this interest, the erection of new mills has continued, with a reported general improvement in the character of the products.

"In the department of iron industry, the number of blast furnaces for the manufacture of pig iron, in operation during the past year, has been in excess of that of any former period while an unusually large number of new furnaces are now in process of construction.

"During the same period the rolling mills of the country