Evening Telegraph

MONDAY, DECEMBER 19, 1864.

MACHINE TOOL-MAKERS.

HENRY MAUDSLAY.

If we trace back the history of what may be termed machine tools, we shall find that they owe their birth to the patent lock. When Bramah, at the latter end of the last century, turned his attention to the improvement of the tumbler lock, he found that the most skilled hand-labor of the day was incapable of turning out the precise and beautifully executed work needed, and even if it had, the expense would have been so great as to preclude its becoming an article of general sale. In order to accomplish his task, it was necessary to invent special tools, many of which were of a self-acting character, and all possessing a delicacy of application and an accuracy and speed of working which left far behind the efforts of the most cunning hand.

From the workshop of this ingenious engineer it may be said that the mechanical greatness of England took its rise. He it was who fostered the latent skill of the young smith, Henry Maudslay, and strengthened the passion of Joseph Clements for accuracy of work. Giving, as we must do, Bramah the credit of being the first great tool-maker, yet we feel that it was to Henry Maudslay we owe the merit of raising a race of machinists—for the term tool-maker is, we think, too insignificant—who have made England famous among nations. We shall be better able to appreciate the merit of the master, Bramah, and his man, Maudslay, when we remember what William Fairbairn has said, that when he began life, at the commencement of the present century, the human hand performed all the work that was done. And how it was performed we have the testimony of Watt, who experienced the greatest difficulty in getting work executed, where an almost mathematical accuracy was demanded. It was a mercy for mankind that he was able to finish the first working model of his steam-engine, so utterly impossible was it to get the steam-cylinder turned with any approach to truth.

Henry Maudslay, when a smith in the Arsenal at Woolwich, was invited by Bramah, who had heard of his ability, to enter his service. The youth, for he was only eighteen at the time, adopted a very characteristic method of giving his new master a taste of his skill. Pointing to a worn-out old vice in the workshop, he asked if the fact of his being able to renew it in the course of the afternoon would be considered his diploma of proficiency; this being agreed upon, he immediately set to work; before the appointed time the vice was as good as new, and he gained at once a first-rate position in the shop.

Whilst a journeyman with Bramah, he invented the famous slide-rest, the prolific parent of a whole race of labor-saving machines of the present day—the slotting-machine, the planing-machine, and many others, all tracing their parentage to this simple contrivance. Before its invention, the turning-lathe depended for the accuracy of its work entirely upon the muscles of the workman. If, in turning a cylinder, for instance, the tool at one moment cut deeper than at another, by reason of the workman bearing more heavily upon it, the whole work had to be gone over again. The slide-rest, by substituting a fixed tool for one guided by the human hand, at once abolished the possibility of these inaccuracies, and inaugurated the reign of that mathematical truth in workmanship without which great machinery cannot work.

After Maudslay left Bramah, he set up a little shop of his own, first in Wells street, then in Margaret street, Cavendish square, where he was found out by the elder Brunel, and employed to construct the famous block machinery at present in use in Portsmouth Dockyard. His power of generalizing from a few hints was strongly exemplified in the intercourse between the young inventor and this rising young machinist. Brunel, with that fear all inventors have of disclosing their designs prematurely to others, was in the habit of taking drawings of fragments of the proposed machinery to Maudslay for his inspection, without mentioning the real nature of the work he wished accomplished.

At the third visit, however, Brunel was surprised to hear the young man say:—"Ah, now I see what you are thinking of, you want machinery for making ships' blocks." These machines, which were the first labor-saving works set up in our public establishments, at once evinced the enormous amount of productive power the country had acquired.

There is scarcely a contrivance in use among modern machinists which cannot find its origin in this series of engines, for they number forty-four, at work nearly sixty years ago, and at present in excellent condition and in full employ.

These machines, with the aid of ten men, do the work that formerly occupied one hundred, and moreover, they do it infinitely better. The only wonder to us is, that the vast superiority of these machine-tools having been thus tested at so early a date, their use did not more rapidly increase; but there are pauses, for some unaccountable reason, in all revolutions, and it was full thirty years from the date of this invention before the full tide of labor-saving appliances began to be felt.

The punch by which thick plates of iron are pierced for riveting was another of his inventions by which great accuracy is gained and an immense amount of labor is saved.

When Maudslay left Margaret street, in 1810, he removed to the site of an old riding school in Lambeth Marsh, and there founded, together with his partner, Mr. Field, the world-famous establishment of Maudslay & Field. Mr. Smiles has remarked, with great truth, that the shop of Maudslay & Field gave a stamp to the workmen who labored in it, just as the Universities of Oxford and Cambridge give their peculiar impress to their respective students—an impress which never leaves them. Like Mr. Penn, the great marine engine-maker, Maudslay "could not afford to turn out anything but first-rate work;" and this accuracy and perfection of finish has been passed on to other shops by means of the Nasmyths and the Whitworths, who learned their art under him.

In short, Maudsley was to his "hands" under him what Dr. Arnold was to his boys, a presiding spirit, whose teaching made a lasting impression upon all those with whom he came in contact. It was his habit to enter his workshops when the men were absent, and carefully to note every man's work whilst in progress at the bench. He used to make his remarks with a piece of chalk; sometimes in terms of approbation, but sometimes sharply and tersely, if reproof were needed. When the men returned to the shop, the reading of the master's eye was thus set plainly before them, and caused no small excitement.

The example he set of exquisite work made a lasting impression, and in the history of manufacture there is nothing an Englishman should be prouder of than the character of the machinery it produces. Those who carefully inspected the machinery department of the late International Exhibition could not help being struck by the beauty, accuracy, and solidity of the English workmanship, when compared with the dimness and want of finish of the French and Belgian productions. We may be thought fanciful, but to us there is something awe-inspiring in the inevitable regularity of a vast machine of English work, and there is an expression of calmness in its irresistible action which reminds us of the presence of some fate; look down the hold of the *Great Eastern*, good reader, at her engines when she is in motion, and you will doubtless feel the full force of what we say.—*Once-a-Week.*

THE STEAM-HAMMER—JAMES NASMYTH.

James Nasmyth, the Thor of the present age, was brought up under the immediate eye of Mandslay, and perhaps was more intimately associated with him than any other person, for he was the assistant appointed to take charge of the great machinist's own particular workshop, and the pupil has done credit to his master. Nasmyth, unlike the other great machinists, was by no means a self-made man, at least as regards his education, as he was the son of the Alexander Nasmyth, of Edinburgh, whose landscapes have charmed us all; moreover he was a scientific man, and his son therefore started in life with hereditary ability. Nevertheless, he fought his way up as a great smith unaided. His first employment was as an assistant in Maudslay's beautiful little workshop, at ten shillings a week; and in the establishment of this famous firm he learned his art. Nasmyth's fame rests mainly upon his steam-hammer, a tool without which modern forging could not be accomplished. Indeed, it was a consequence of the demand for such a Cyclopean instrument that it was produced, and it is a singularly apposite example of the manner in which great works sometimes produce great tools, as surely as great tools lead to the production of mammoth works.

When the *Great Britain* was being constructed, it was at first intended that she should have paddle-engines; such were accordingly designed for her by the late Mr. Humphreys. The paddle-shaft, however, was to be of such enormous proportions that no forge in the kingdom was capable of turning it out. In this difficulty, Mr. Brunel was forced to apply to Mr. Nasmyth to aid him with his advice. Mr. Nasmyth's reply was a sketch made on the spur of the moment of his famous hammer, and returned by post that night. Unlachily, it was determined to change the paddle for the screw, and the paddle-shaft therefore was never required.

The great hammer accordingly remained a dream upon the paper, as far as its inventor was concerned, for, strangely enough, none of the great iron-founders would have anything to do with it. Some time after, when on a visit to a celebrated foundry in France, Mr. Nasmyth was shown an enormous piece of forged work; curious to know how such an unusual size had been accomplished, he asked the question of the director of the works. "Why, with your steam-hammer, to be sure," was the instant reply. The Frenchman had been shown the drawing by Nasmyth's partner at the time it was made, and with a keener appreciation of its value than was evinced by the English machinists, he determined to have one made.

This was certainly an instance but little in accord with the English manufacturer's boast, "that if not the first to invent, he is the first to see the value of the inventions of others," for, with a demand for gigantic forgings far beyond what exists in France, we yet allowed our friends on the other side of the water to steal a march upon us. However, the steam-hammer is now in common use, and year by year it is assuming larger proportions. The effect of its introduction is the vast increase of the size of the forgings, now so easily accomplished, and the consequent enormous development of the proportions of our machinery; in fact, there is no limit now to the size of the engines that can be produced, or to the power that the use of this simple instrument has placed in the hands of man. Without it, we should have no armor-plated ships of war, no great engines for their propulsion, no enormous works in iron of any kind, such as have marked the last dozen years, and have at once elevated men, mechanically, from mere pigmies to a race of giants.

One of the most useful applications of the principle of the steam-hammer is to pile-driving. We well remember, years ago, watching a party of twenty men at this work on the quay at Rotterdam, and the Dutchmen should know something about the operation. This was performed by the ordinary monkey, which rises and falls every three minutes. Now by the use of Nasmyth's steam pile-driving machine, a pile can be driven in four minutes as deeply as by the old method it could be in twelve hours! The steam-hammer sits on the shoulders of the pile like the Old Man of the Sea, adding its dead weight to its lively taps at the rate of eighty blows a minute! In consequence of this rapidity of action, works of reclamation from the sea, before undreamed of, will be effected; and an immense impetus will be given to all building works constructed on unstable ground.—*Once a Week.*

JOSEPH CLEMENTS.

Another great mechanic, bred in the school of Bramah, and afterwards in the employ of Maudslay & Field, was Joseph Clements. He lays claim to have made the first machine for planing iron. There have been more disputes respecting the parentage of this machine than perhaps any other; but Clements' machine, which was finished in 1825, was certainly the earliest in action, and in the metropolis it did the whole work of the trade for many years. The value of a machine which can produce a true plane is incalculable.

Indeed, Whitworth has written a treatise upon it, as a standard of reference in mechanical productions. Before the planing-machine came into use, true planes were approximated, for they could not wholly be obtained, by means of chipping and filing. Clements' machine, however, at once superseded that method, and for some years, Mr. Smiles informs us, his income mainly depended upon the earnings of this iron planer, which never ceased working night or day, and earning for its master as much as £10 for every twelve hours' work. In every machinist's shop is now to be seen this beautiful tool, cutting a long narrow ribbon of metal with its keen tools, producing the most perfect work, and tended in many cases only by a lad. Clements, in consequence of the great fame he had acquired for accuracy of work, was sought by Professor Babbage, to construct the famous calculating machine.

This extraordinary work, after progressing for some years, was however discontinued by Government, and it remains a magnificent fragment of mechanical skill. The working drawings, we are told of the calculating machine alone, irrespective of the printing machine, which was equally elaborate, covered no less than four hundred square feet of surface. The apparatus was intended to calculate with unerring accuracy, and this it is fully equal to accomplish, for when through any cause an error has been made, it actually reverses its action, and to use Mr. Smiles' expression, "runs itself out."

Although this machine was never finished in England, Messrs. Schentz, of Stockholm, after twenty years' labor, completed this extraordinary combination of what may be also termed "thinking iron," and it was first displayed in the Paris exhibition of 1855. Although the work was completed by foreigners, it was done from the English drawings; therefore the merit is wholly due to Babbage and Clements. Our own Government have procured a copy of this machine, and it is now in actual use at Somerset House, working out annuity and other tables for the Registrar-General, possibly calculating our mortality tables—a dead piece of machinery counting up our dead men—a most appropriate occupation. Clements followed the lead of Maudslay in reforming a very important detail in mechanism. Before the time of these thoughtful workmen there existed no regularity with respect to those all-important parts of mechanism, screws and nuts. Every maker suited his own fancy with regard to their construction, and there was no such thing as uniformity with respect to the pitch of the screw. The consequence was, that on taking a machine to pieces for repair, the screw-hole had to be drilled out and recut, so as to suit the thread used in the shop.

The great expense and loss of time caused by this arrangement led Clements to the conclusion that the number of threads should be settled according to the length of the screw. He did this, and constructed a screw-engine lathe to do the work of one accomplished by hand. This plan the trade unanimously accepted, and now there is no more trouble about this very important implement which holds machinery together. Clements did his work thoroughly, but he would have his own price for it; like Mr. Penn, who could not afford to turn out imperfect work.

His screws were constructed with mathematical accuracy, but they were unfortunately costly. A story is told of his having received an order from America to make a large screw "in the best possible manner." The work was accomplished with great care, and the American was astonished to find a bill for several hundred pounds for the work done; the matter was referred to arbitration, and of course the case went in favor of the machinist. It may be interesting to the public to know that Clements is the inventor of the too effectual steam-whistle of our locomotive.—*Once-a-Week.*

COAL AT COST—$7·50 PER TON.—THE Consumers' Mutual Coal Company.—Incorporated under the General Mining Law of the State of Pennsylvania, October, 1864.

DIRECTORS.

JAMES LYND, H. A. PAUL,
E. E. JONES, POWELL F. CLAYTON,
THOMAS R. GARRED.

Office, No. 5½ S. SIXTH Street.

The Company is still receiving subscriptions to its Stock at $10 per share, and supplying its Stockholders with the best quality of White Ash Schuylkill Coal, at $7·50 per ton.

In regard to the title to the colliery, and to the corporate franchises of the Company, reference can be made to their counsel, David W. Sellers, Esq., and in regard to the quality of the coal, the capacity of the mines, and the profitableness of the entire enterprise, to Strickland Kneass, Esq., the able Chief Engineer and Surveyor of the city of Philadelphia, or to Stephen Harris, Esq., Mining Engineer, Pottsville.

The number of stockholders is now one thousand, comprising all classes of the community. Nearly 5000 tons of coal have been delivered to subscribers at from $7 to $7·50 per ton, below the market price. The enterprise being managed by the stockholders for the mutual benefit and advantage, there is no inducement for discussion or unfair dealing, either as to the weight or quality of the coal delivered to each. We have branch offices in Germantown, Manayunk and Norristown, and residents in those places can be supplied as readily as if they were within reach of the central yard.

Never having less than 600 or 700 tons at our city yard, all orders can be promptly supplied. Circulars can be had at the yard, containing full details of the organization of the company, the opinions of counsel and engineers as to the title to the colliery, and as to its capacity, etc., and a list of our stockholders. The public are freely invited to call for these circulars and make full inquiry into the merits of the enterprise. Tickets are also issued to call at the yard, No. 1317 CALLOWHILL Street, and examine the coal and the system of delivery.

It is not probable that the stock of the Company can be had at par after December 25, 1864.

Agent in Manayunk—JOHN ADAMS.
Agent in Germantown—STEPHEN ROBERTS.
Agent in Norristown—CHARLES P. PERRY.

Twenty cars can find steady employment at the Yard, No. 1317 CALLOWHILL Street.

We the undersigned, stockholders in the Consumers' Mutual Coal Company, having given our attention to the working operations of this organization, take pleasure in bearing testimony to the faithful and energetic direction of this important enterprise; and in offering this method in evidence of the efficiency of the officers of this company. We most earnestly present this organization to the public as our confidently assured support, from the desire of the present stockholders that the subscriptions to this stock shall be realized to actual consumers, so that the original object shall be carried out, viz., supplying a great want in an important department of domestic economy. It is therefore desirable that consumers of coal should speedily come in and take the remaining shares, thereby preventing any portion of the stock from falling into the hands of speculators—which the directors have been careful so far to avoid.

PHILADELPHIA, November 22, 1864.

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John Butish & Son,	N. S. Lawrence,
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Edward Bowsby,	H. H. Shillingford,
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R. P. McCullagh,	Robert McGregor,
J. D. White,	T. E. Chapman.
Amos Rockhill,	

Among our Stockholders are the following named persons, most of whom have received their coal, and to whom reference can be made:—

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