

BOYS AND GIRLS

The Inventor of the Steam Hammer.

(The Rev. John T. Faris, in the 'Wellspring'.)

When James Nasmyth, who was born in Edinburgh in 1808, was ten years old, it was his delight to visit machine shops and iron foundries. He spent his spare time fashioning tops, kites, balloons, and brass cannon. When he was sixteen he made small steam engines, and sold several for fifty dollars each. His bedroom was fitted up as a machine shop, and many a casting was made there at night, after his day's work in school was done. A friend gave him the use of his smithy for larger work.

When he was twenty-one he went to London to apply for work at the foundry of Henry Maudsley, a famous engineer of the day. He carried with him a small steam engine of his own construction, and a number of mechanical drawings. When he made known his errand, he was disappointed on learning that Mr. Maudsley desired no apprentices. The courteous manufacturer, however, showed him through the works. Then he was more than ever anxious to secure employment. Seeing a workman taking ashes from a furnace, he enthusiastically cried: 'If I might only do that in your service, I should be satisfied!'

Attracted by his eagerness, Mr. Maudsley examined his model engine and drawings. He found them so perfect that he declared an apprenticeship unnecessary, and offered to take him into his private workshop at ten shillings a week.

Even in 1829 it was not easy for a young man to support himself in London on ten shillings a week. But the young engineer made up his mind to hard work and to strict economy. He was soon settled in a small room. His meals, prepared by himself, were eaten in this room. For breakfast and supper he had nothing but dry bread. He denied himself butter until he was receiving fifteen shillings a week. His dinner he cooked on a little oil stove of his own invention.

His first holiday he spent in making a trip to Liverpool to see Stephenson's 'Rocket,' the locomotive which had just been completed for the Liverpool and Manchester Railway. He was eager to learn what he could of locomotive construction. The day of the trial trip was spent by him to such purpose that he was afterwards able to construct locomotives after his own designs. These were so satisfactory that a large premium, above the stipulated price, was paid for them by the Great Western Railway.

His employer dying when Nasmyth was twenty-three, he determined to go into business for himself. Although his capital amounted to only about three hundred dollars, he started a foundry on an upper floor of an old Manchester cotton mill, for which he agreed to pay two hundred and fifty dollars a year rent.

Not long after his establishment orders were pouring in on him at such a rate that it became necessary to seek larger quarters. Resolving to move once for all, he leased six acres near the Bridgewater canal, and the famous Bridgewater foundry was constructed. It required courage for a young man with limited capital to undertake such a responsibility as was involved in the change. But James Nasmyth had the courage.

In his new foundry he was more successful than ever. Many inventions were perfected, among these the screw safety ladle. A number of his workmen having been seriously

burned by the old-fashioned ladle, used to carry the molten iron from the furnace to the moulds, he contrived a new instrument by the use of which one man was able to perform safely labor which had always required the efforts of a dozen.

But James Nasmyth's greatest invention was the steam hammer. Hammers had been constructed which were operated by steam, but they all were built on the principle of the hand hammer, and swung in an arc. These were effective for small castings only. But, in 1839, the builders of the steamship 'Great Britain' found that the paddle shaft required would be too large to be forged by any hammer available. Thereupon Nasmyth determined to try the effect of a hammer which delivered blows vertically, instead of horizontally. His original plan was to have the instrument fall from a height by its own weight. A later improvement was to drive the falling hammer by steam.

Drawings of the proposed hammer were then made and submitted to the builders of the steamship. They were approved, and the powerful implement would have been constructed at once, but the invention of the screw propeller decided the projectors to abandon the idea of the monster paddle shaft, and Nasmyth's original drawings were then laid away in his sketchbook.

Some time later, during his absence from the foundry, two visiting French engineers saw the sketches. They were so impressed by the possibilities of the tool that they went home and constructed a vertical steam hammer in their own foundry. Nasmyth knew nothing of this until, two years later, during a trip to the continent, he visited the French foundry. Observing an engine crank which could not have been forged by the old hammer, he asked how the work had been done. 'That crank was forged by your steam hammer,' was the reply.

The French engineers proceeded to show the Englishman the hammer they had built from his plans. He was delighted. The machine was crude, and it was often out of order. Upon examining it, he found the reason for its failure to work satisfactorily, and generously pointed out the defects, suggesting remedies for all of these.

Soon after his return home, the inventor constructed a hammer for himself. Patents were secured. The British government became interested, and large orders were placed. In 1845 the invention was further developed into the first really successful pile-driver.

This pile-driver was tested when the Devonport dockyard was rebuilt. The following account of this initial test has been given by one of Nasmyth's biographers:—

'And now the first pile was chosen, and the new machine fixed to its head. "We'll run a race with you," said the dockyard workmen to Nasmyth. "Give us a pile, too, and we'll drive it our way and see who will have finished first." Whether the men had any expectation of coming off victorious in the contest we cannot say; but, if so, they must have been grievously disappointed at the results. Nasmyth accepted the challenge, and the driving of the two piles began at the same moment. Down came the steam hammer at the rate of eighty blows a minute on the pile head, the weight of seven tons helping to force it downward at every stroke. Patiently the men toiled at their familiar task, but at the end of five minutes Nasmyth's pile was driven and the busy hammer ready for a fresh task. The workmen, too, accomplished

their undertaking, but it took them twelve hours to do it, in which time Nasmyth would have driven no less than one hundred and forty-four piles. The success of the new pile-driver was greeted with ringing cheers. In which, probably, the defeated workmen joined as lustily as any.'

Other inventions were perfected in later years. In 1853 Nasmyth discovered that by forcing a blast of steam through molten metal, the process of puddling iron, hitherto imperfectly performed by hand, was made much more effective and safe. But almost at the same time, Bessemer invented his process in which a blast of air was substituted for the blast of steam. Nasmyth tested the process, and at once remarked: 'The results are so magnificently successful as totally to eclipse my process.' It is gratifying to note that Bessemer, appreciating the labors of his unsuccessful rival, offered him a share in his patent. But Nasmyth, although owning that this would have meant another fortune to him, declined, and adds this explanation: 'I have already made money enough.'

He died in 1890, at the age of eighty-two. His biographer says of him:—

'His ceaseless industry and his steady perseverance in overwhelming difficulties not only brought him to success, but were a blessing and example to others; for the hand of the diligent maketh rich, not the diligent man alone, but often many of those who come under his influence. Wealth and success having been won, the reward of honor and of intercourse with the great was not withheld from the faithful worker, the old-world prediction being fulfilled once more as literally as ever: "Seest thou a man diligent in his business? He shall stand before kings; he shall not stand before mean men."'

A Box of Chocolates and a Bible.

(Susan Hubbard Martin, in the 'Ram's Horn'.)

The children were singing and the sweet, childish voices filled with melody every corner of the old church, even floating out upon the Sabbath stillness.

'Do you fear the foe will in the conflict win? Is it dark without you, darker still within? Clear the darkened windows, open wide the door,

Let a little sunshine in.'

Some one entered; a boy of seventeen or eighteen, with a shy and uncertain manner, indicating how little he felt at home. He wore a coarse ill-fitting suit of gray, his hands were hard and calloused, but there was an open, honest look in the brown eyes that the Superintendent liked as he came towards him.

'Won't you come into one of the classes?' he began, pleasantly.

The boy shook his head. 'No, thank you, sir, I don't intend to stay long,' he answered. 'I just heard 'em singin' and it was such a pretty tune I somehow wanted to hear the rest of it. Don't mind me, please, I'll just sit quiet and listen, and after a bit I'll go out, so as not to disturb anyone.'

The Superintendent smiled. 'But I do mind you,' he answered, 'still if you would rather—'

Just then Miss Ward looked up and caught the Superintendent's eye. She was teaching a little class of girls just across the aisle. She was a slender young woman with a sweet, refined face and quiet, gracious manners. There was that about her, that indefinable something which stamped her as being in fel-