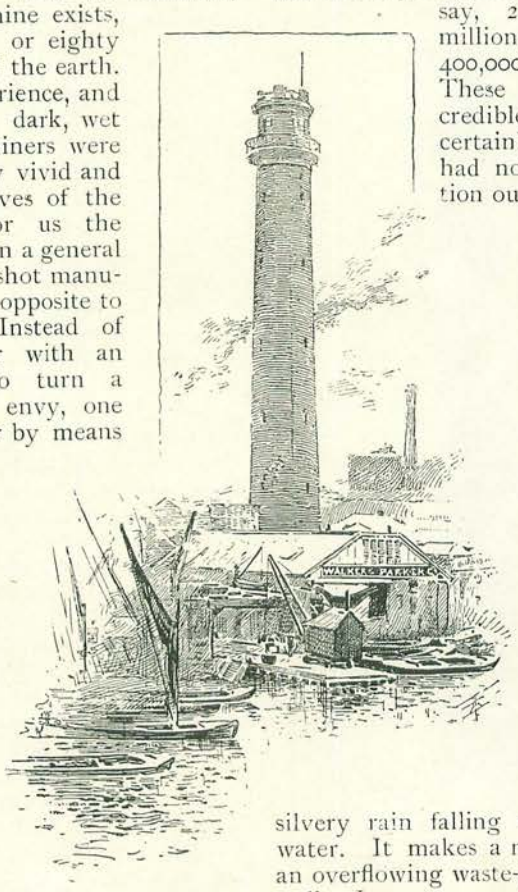
Up a Shot Tower.

THE writer of this paper, in the pursuit of his profession, has probably sunk lower and attained to greater heights than the majority of his *confrères*. Some months ago he required material for an article on antimony, a metal used for the hardening of shot and shell. He went to Cornwall, where an antimony mine exists, and plunged seventy or eighty feet into the bowels of the earth. It was a unique experience, and ten minutes in that dark, wet hole, in which the miners were busy, gave one a very vivid and lasting idea of the lives of the men who secure for us the treasures of Nature. In a general way the conditions of shot manufacture are precisely opposite to those of mining. Instead of descending a ladder with an agility calculated to turn a monkey green with envy, one has to ascend a tower by means of steps which even a hardened treadmillite might conceivably agree would constitute a fair "turn." Shot—small shot that is, not bullets, the latter being made in moulds—is manufactured at the top of a tower, or in some place where a considerable space exists beneath. A disused mine shaft is just as good as a tower, the indispensable condition being a couple of hundred feet of air through which the shot may fall.

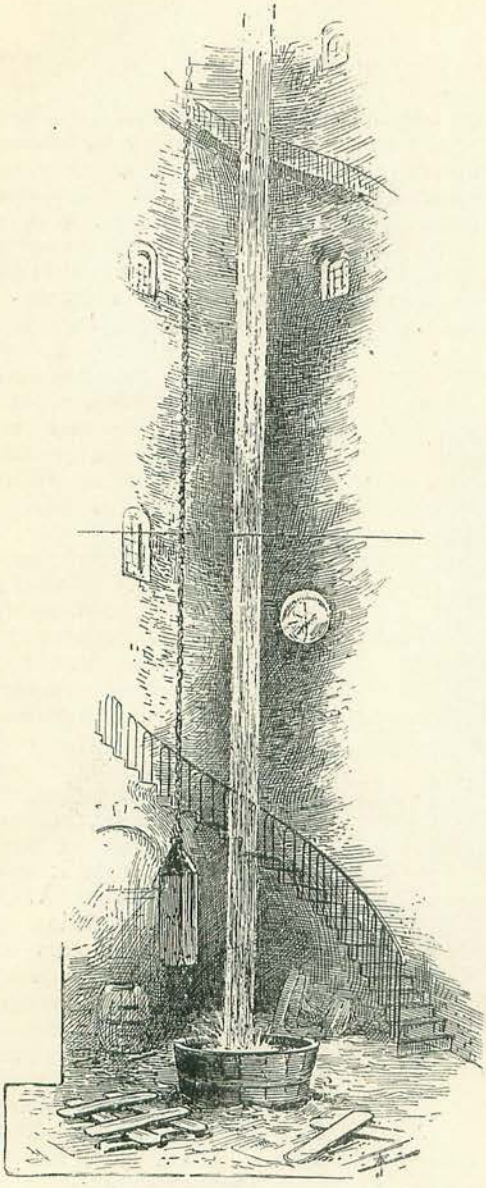


THE SHOT TOWER.

Before we describe the manufacture of shot it will be interesting to examine a 28 lb. bag, such as the majority of our readers have probably seen at some time or other. The bag laid flat is roughly the size of this page ; and 28 lbs. far from fill it. If you take the trouble to count the shot, or get at an estimate of the number the bag contains, you will find that there are from 50,000 to 70,000, the number depending upon the size of the shot. Assuming one knows nothing about the matter, it would naturally seem that the manufacture of so many separate little balls must occupy a terrible time. To mould them would be an interminable process. As a matter of fact shot is produced at a rate varying from, say, 24 millions to 30 millions an hour—from 400,000 to 500,000 a minute. These figures sound incredible, and we should certainly doubt them if we had not made the calculation ourselves.

Near the south end of Waterloo Bridge, and within a few yards of the Thames, stands a monster structure known as the Shot Tower. It is a familiar sight, but not even your London cabby, in nine cases out of ten, knows that it is a shot tower. With the permission of the proprietors we will pay it a visit, and see how the shot is produced. Arrived at the base, the first thing we notice is a sharp, incessant shower of silvery rain falling into a huge tub of water. It makes a noise very like that of an overflowing waste-pipe high up in one's wall. Its source we cannot quite see. A hundred feet above us is a floor or first stage, through an opening in which the shower is passing. Evidently it begins from a much greater height than this even.

The prospect of the climb is not particularly enticing. There are 327 steps, it is a hot day, and the place is necessarily not scrupulously clean. However, duty calls, and provided with a canvas bag to save one's hand and cuff in clutching at the railing or iron banister, we make a



AT THE BOTTOM OF THE TOWER.

start with all the confidence begot of the recollection of schoolday feats. Up, up, up—phew!—it is warm work, and breathing is not so easy after a hundred and fifty steps have been rapidly passed over, as it was at the beginning. All the time we have been running round the building, immediately inside the shell, as it were, and on our left, as we make revolution after revolution, the shower of lead continues, the sun through the various windows now and again glinting on it and making it look more like summer rain than ever. On the first stage no one is at work, and there is nothing to see except a crucible or boiler, pretty much the shape of that we have seen in the family laundry. So away we go again manfully, with "Excelsior," and the "Pilgrim's Progress," alternately flitting through our minds, until at last the top stage is reached. Though we are some 200 feet above the earth, we are not exactly on the summit of the tower yet, but only in a sort of top story, and some feet above us is the roof on which a flagstaff is erected, apparently in a vain attempt to get at the sky.

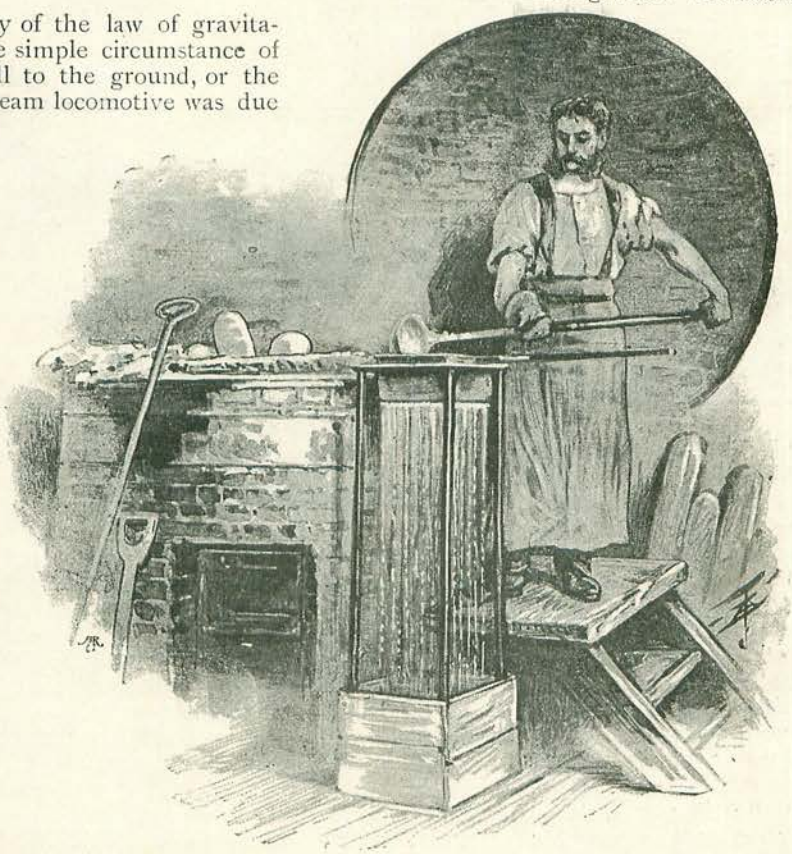
The secret of shot-making is ours at last. In the centre of this top stage is a trap door wide open, yawning in a sinister way which warns the new comer to beware. Through the trap door runs a huge chain attached to an elongated box by means of which the pig lead leaning against the walls has been hoisted. A man is standing at a boiler, similar to that seen on the stage below, containing the molten lead. The heat is very great, and as he ladles the liquid metal into a perforated pan or sort of colander in front of him, the perspiration stands out on his brow in big drops, suggestive of the shot itself. To make shot, however, something more is essential than a great height, a colander, and molten lead. The metal before it arrives in pig form—that is, in large bars—has been prepared with antimony or arsenic. When it has been thoroughly heated, a sort of scum forms on it, which if it were from milk would be called cream, but being from lead is called dross. This is carefully preserved. Some of it is placed in the perforated pan before the molten lead is poured into it. The lead makes its way through the dross, and then escapes through the holes in the pan, into space. The degree of heat, the amount of dross, the distance, the quantity of lead are all things which have to be thought of, and which can only be properly regulated by an experienced hand. It looks simple enough to pour the hot lead into the pan, but it is very much simpler to spoil the shot by indifferent knowledge of what is wanted.

Whilst our artist is getting a picture of the man at work, we may take the opportunity of telling our readers what we have been able to discover of the origin of this method of shot-making. The story goes that it was all an accident, just as Isaac

FEEDING THE MELTING POT.

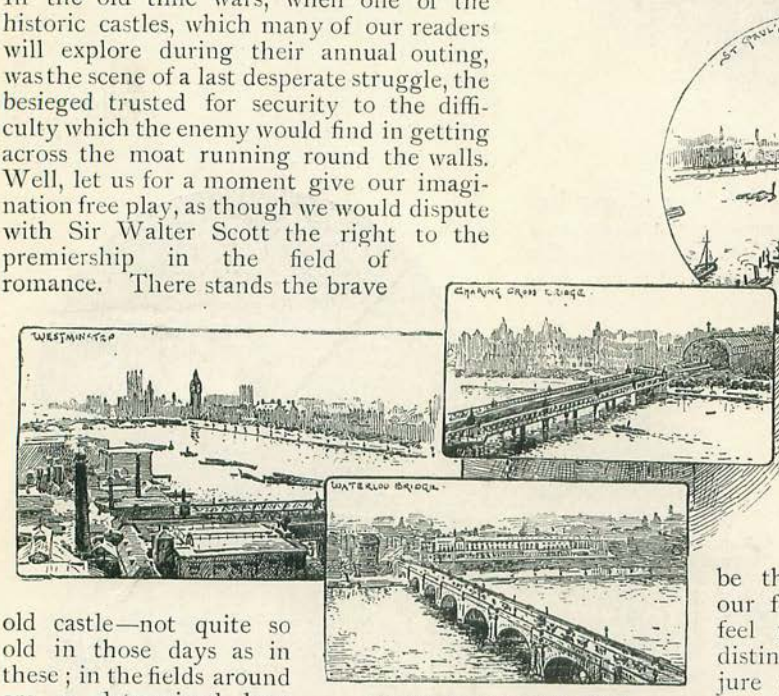
Newton's discovery of the law of gravitation was due to the simple circumstance of seeing an apple fall to the ground, or the discovery of the steam locomotive was due to the throbbing of the kettle on Stephenson's hob. Somewhere in the last century a Bristol mechanic named Watts, who was employed in cutting up strips of lead into small pieces for the purpose of shot, is said to have imbibed a little too freely. He went to bed in a muddled state, and as is, we should imagine, not improbable, dreamt various dreams. Having taken too much strong drink and too little water, he would naturally conjure up visions of the only ale with which Adam was acquainted. He saw it rain heavily, and as he watched, to his surprise the rain became lead, and the earth was covered with shot. Awaking to his sound senses, Watts is pictured dwelling on his dream until he came to believe there was something in it. He determined to make an experiment, and proceeded forthwith to the tower of St. Mary Redcliff in Bristol. He is said to have proved the correctness of the idea of the dream. Shot could best be made by dropping the lead from a great height. Shrewd man as he was—up to a point—Watts by this discovery made, according to the chronicler, £10,000. Having made a fortune, however, he did not know how to keep it. He determined to build Clifton Crescent, but the excavations, &c., necessary to so grand an enterprise exhausted his money before a single house was commenced. Hence Clifton Crescent, we are told, became known as Watts's Folly.

This is one explanation of the inception of the idea of shot-making as now witnessed.



RUNNING THE LEAD

Like many other pretty stories, however, it might not bear too close a scrutiny. We believe the notion of making shot by letting lead fall from a height is older than the date when Watts flourished. In the Watts story, too, we can find no reference to the essential tub of water at the base to cool the pellets. If they fell on to the hard ground before they were cold, they would be bruised and spoilt. At the same time a much more likely story is even more difficult to verify. It is to be found in some curious old book somewhere, no doubt, but so far we have to confess to an inability to trace it. We have the story, however, on the authority of one who has long been interested in shot-making, though he cannot indicate the source of his information. In the old time wars, when one of the historic castles, which many of our readers will explore during their annual outing, was the scene of a last desperate struggle, the besieged trusted for security to the difficulty which the enemy would find in getting across the moat running round the walls. Well, let us for a moment give our imagination free play, as though we would dispute with Sir Walter Scott the right to the premiership in the field of romance. There stands the brave old castle—not quite so old in those days as in these; in the fields around are a determined host preparing to storm it; inside its walls are the equally determined defenders, who know by the disposition of the enemy that the crisis is at hand. A little later and the besiegers are actually scaling the walls. They are met and driven back with horrible torture by men armed with boiling lead, which falls, in probably hundreds of separate pieces, into the water hissing and spitting below. Then, in the time to come, when the moat is cleared out, a number of more or less perfect pellets, in a spherical form, are found at the bottom, and the idea of shot-making is secured. This account, at any rate, gives us the indispensable water into which the metal must fall if it is not to be injured.

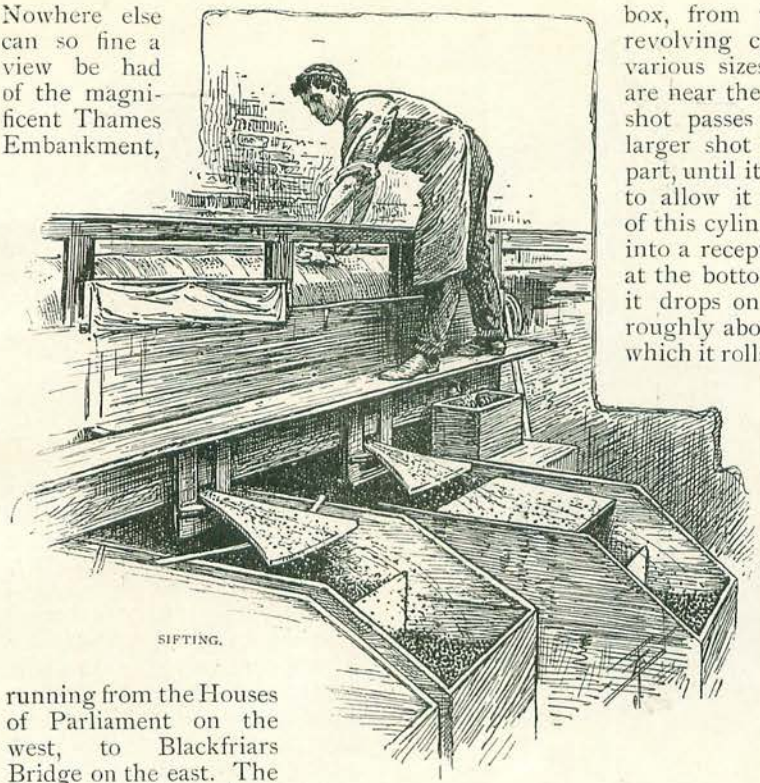


LONDON FROM THE SHOT TOWER.

However all this may be, here is the man hard at work manufacturing shot in a way which a recent generation certainly did not invent. Having got all we want concerning him, we will go out on to the parapet which runs round the outside of the tower, on a level with this top floor. As we open the door a breath of deliciously fresh wind sweeps in. The height is a giddy one, so giddy, in fact, that some people have positively refused to go outside and walk round the tower. It requires more nerve than one is perhaps prepared to admit, especially when, unaccustomed to be thus elevated above our fellows as we are, we feel the tower give a distinct lurch, and conjure up visions of being flung like a lacrosse ball, far away across the river to the embankment on the other side.

On a clear day the sight from the Shot Tower is one of the best in London. But it seldom is really clear in this mighty Babylon of ours, and, though we have made several pilgrimages to its summit, we have never seen more than a mile or so through the smoke-haze that hangs over the capital. Still one gets a panorama of a not inconsiderable portion of London life. Looking away north one of the first things noted in the distance is the *Tit-Bits* sky-sign.

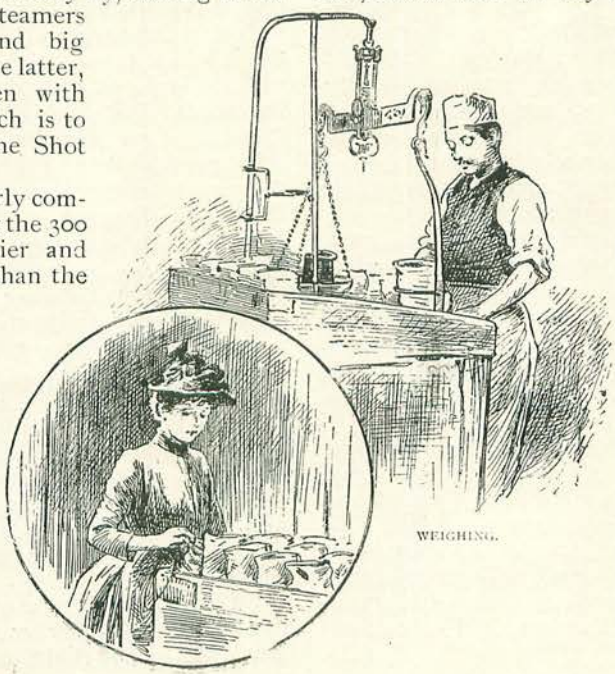
Nowhere else can so fine a view be had of the magnificent Thames Embankment,



SIFTING.

running from the Houses of Parliament on the west, to Blackfriars Bridge on the east. The Thames itself, not here the silvery, but very much the muddy Thames, rushes hurriedly by, bearing on its bosom pleasure steamers and row boats and big barges; some of the latter, by the way, laden with the pig lead which is to find its way up the Shot Tower.

Our visit is nearly complete. Descending the 300 odd steps, an easier and quicker process than the ascent, we devote ourselves for a while to watching the process of finishing off the shot. After removal from the tub, it has to be dried by being laid on a hot slab. Thence it is transferred to a box, from which it passes to a revolving cylinder with holes of various sizes. The smallest holes are near the box, and the smallest shot passes through them. The larger shot passes on to another part, until it finds holes big enough to allow it to escape. Once out of this cylinder-sifter, the shot falls into a receptacle, with an aperture at the bottom. As it leaves this, it drops on to a piece of wood, roughly about a foot square, down which it rolls into one of two boxes. If you examine this piece of wood, you will find that it is slightly inclined, the incline giving the shot a momentum just sufficient to carry the imperfect into one box, and the perfect into a second. It is the most ingenious device imaginable. Having been thus assorted, the shot is put into a revolving box containing blacklead. The revolutions not only serve to thoroughly blacklead the shot, but to wear off any little excrescence, and make them more perfectly round. They have then to be weighed in the 28 lb. bags referred to above. From the weighing machine they are passed to a table at which a woman sits with needle and thread. Their mouths are sewn up, they are ready for the market, and we have seen practically all there is to be seen of the manufacture of small shot.



WEIGHING.