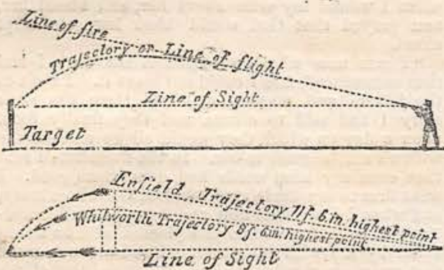
THE "SWEEPS" OF FORMER TIMES.

Every missile, whether projected from a gun or from the hand, would pursue the flight once commenced with uniform velocity in the line of fire, were it not retarded by gravity and atmospheric resistance. Of these forces, gravity attracts it to the earth, and the resistance of the air continually reduces its speed. These two distinct motions, the one increasing as the other diminishes, causes it to move in a parabolic curve, termed its *trajectory*, instead of in the line of fire. Hence, a bullet invariably falls below the object at which the piece is directed.



Deviations to the right or left, from the line of sight, are due to defective construction. The spherical form of the old musket ball offered the largest surface of resistance to the air it traversed, and the inequalities of the musket bore caused deflections in its flight. Moreover, as the spherical ball did not fit the bore tightly, when the piece was held horizontally, the force of the explosion drove the ball alternately against the upper and lower sides of the barrel, until it finally left the muzzle—its subsequent direction chiefly depending on the last impulse received, while, at the same time, much of the force exerted was necessarily lost. To reduce this *windage*, as it is termed, without too greatly increasing the friction against the bore, is peculiar to the rifle.

Every cast bullet has certain inequalities of surface and internal structure, in themselves sufficient, through the resistance of the atmosphere, to make it deviate from the line of aim. The rifling of the barrel gives the bullet a rotary action on its axis, and preserves that axis uniformly in the direction of the line of flight; thereby each irregularity in its structure is successively presented, to be acted on by the retarding forces previously mentioned, during its entire course. The rifle bullet has thus two distinct motions imparted to it on leaving the piece; a progressive one, due to the explosion of the powder, and a spinning one, impressed on it by the spiral groove of the bore.

The counteracting force of gravity on a bullet is in proportion to its mass, but that of the atmospheric resistance, to its diameter and velocity. Hence, as the velocity would be retarded by any increased friction of the bullet against the bore that may be avoided, the inclination, or twist, given to the grooves should not exceed that absolutely needed to produce rotary motion of the bullet, while its form should be such as to offer as little resistance as possible to the air it cleaves.

The elongated rifle bullet satisfies these demands; its form offers least resistance, and is that best adapted to attain the highest velocity, while it reduces *windage* to a minimum.

On the explosion taking place within the rifle, the pressure of the air in front, and of the force behind, so dilate the cylindrical and hinder portion of the bullet, that it adapts itself exactly to the bore, filling the grooves and preventing the loss of any of the power exerted. Thus, the whole force of the powder is concentrated in one direction, while those irregularities of movement are avoided that occur during the passage of a spherical bullet through a smooth bore. Our next number will contain illustrations of three of the Volunteer uniforms, which, for their appearance and suitableness, have been highly approved.

(To be continued.)

CHIMNEY SWEEPERS.

"SWEEP! sweep!" Who is there amongst us who does not remember the old-fashioned cry? The younger born may associate that cry with a thick utterance, a stout, short-built fellow with a curious machine under his arm, and a *tout ensemble* of soot, but folks more advanced in life recall something very different in association with this cry of "sweep." Small boys—the smaller the better—covered with soot from their naked feet, or thick, heavy shoes, to their small caps with a brass plate on the front. These are the objects they so well remember in full cry on a summer's morning in the bright sunshine, or sullying the fair snow in the winter time, and shivering in the keen east wind.

These small boys, and boys of larger growth to look after them, were once upon a time common to our London streets—common as the poor Italian organ grinders, and still worse treated by their owners. Chimneys must be swept, otherwise they catch fire and provide an excellent opportunity for the display of parochial vigilance, by the bringing round of the parish engine at a sharp run, the turning on of the water, the calling of the policeman, and the other characteristic features of a chimney on fire in a London street. It generally happens that the fire has been extinguished long before the engine arrives, but beadledom swears in a board-room that it has rendered efficient service, and some official person condemns the householder in fine and costs. Serious consequences, indeed, may follow from a chimney on fire. The results may be most disastrous—therefore it becomes everybody to know how a chimney on fire may be extinguished, and here follows a simple but efficacious remedy strongly recommended by the domestic faculty:—Throw some powdered brimstone on the fire in the grate, or ignite some on the hob, and then put a board or something of that sort in the front of the fire-place to prevent the fumes descending into the room. The vapour of the brimstone ascending the chimney will then effectually extinguish the soot on fire. Be cautious also to keep the doors and windows tightly shut. Besides being dangerous and disagreeable, if allowed to accumulate in a chimney, soot is valuable as an article of manure, so that in ridding ourselves of a nuisance we absolutely contribute to the benefit of society in general, and to the profit of that sooty fraternity, the chimney sweeps.

Before the Act passed for the prohibition of climbing boys, there was a vast amount of cruelty exercised over these unfortunate children. A poor, friendless child fell into the hands of a master sweep, and was subjected to his tender mercies; perhaps he was bound 'prentice by the guardians of the poor from some parish workhouse, and a little premium given with him—a sort of bonus for taking him off the parochial hands. He was ill-fed, beaten, ill-clad, ill-lodged exposed to every kind of inhumanity, his very calling being barbarous in its nature, and its exercise accompanied by ill-usage, such as only the malicious and depraved could invent, but which benevolent house-

holders tolerated. Through the narrow chimney went the poor little "chummey," now and then sticking fast, and having a little straw lighted below by his thoughtful master just to "stir him up a bit, for fear he should be lazing in the chimbley and get hisself a suffocated." Down the chimney, faint, exhausted, choked, and blinded with soot and smoke, came the child at length, to receive a kick or a cuff for idleness —the said kick or cuff being the instalment of a promised drubbing at home.

At home! the chimney sweeper had a home—a wretched den, an empty garret or a stone cellar, where a little straw served for a bed, and where cleanliness or comfort were entirely unknown. From these dens they turned out into the streets at the first glimpse of day with their sacks, and brushes, and shovels, to scatter themselves over the town and fill the air with the cry "Sweep! sweep!" Who has not heard the old story of the little chimney sweeper who, having been lost or stolen in his childhood, went to sweep his own mother's chimney—his mother being a lady of fortune—and recognising, as people always do in plays and novels, some once familiar object that had never been quite forgotten, and lying down to sleep on the bed in which he was born, was there found and owned by his lady mother? Did he not ever after give holiday to the chimney sweepers upon May day and feast them royally in some suburban tea garden? Well, of course, he is dead—so are his mates—

"Fear no more the heat o' the sun,
Nor the furious winter's rages;
Thou thy worldly task hast done,
Home art gone and ta'en thy wages.
Golden lads and lassies must,
As chimney sweepers, come to dust."

May day was the chimney sweepers' Saturnalia. They paraded the streets in fantastic attire, and danced to the beating of broom and shovel, and to the music of a drum and fife, around a Jack-in-the-green, decked with ribbons, evergreens, and garlands; thus Jack-in-the-green made a goodly show, and the children seemed so thoroughly to enjoy the fun—it was so seldom they ever had any—that nobody could help feeling in their hearts, and their pockets, when a lady in book-muslin went round with a ladle and solicited a gratuity.

But climbing boys were prohibited, and a new era began in the trade of chimney sweeping. Is it not Lamartine who says, "invention is man's attribute?" Well: man exercised his prerogative and invented the *ramoneur*. This ingenious machine, familiar to everybody, does the work better, cleaner, and cheaper than the climbing boys, and saves many poor children from a life of hardship and of cruel persecution.

THE FADELESS FLOWER.

ONE time—it was on a pleasant summer's afternoon, and it was a good many years ago—a number of us children were assembled together at the house of one of our number, whither we had gone to spend a holiday. We were in the great old-fashioned sitting-room, and as we gazed out upon the beautiful landscape, and saw the valley and the hills, and the tall trees, and the distant mountains, and watched the pretty birds that flew so high, we thought how grand it would be if we could have wings, and sail away in the air. Lizzie Carlton said she would be afraid to fly, if she had wings, for fear some hunter should shoot her: because, if she was high up in the air, she might be taken for a great ugly hawk. This suggestion had its weight, and we finally concluded that wings wouldn't be very safe things for us, after all. Then Lizzie said she should like to be very rich, and own all the land she could see, with all the houses, and cows, and oxen, and sheep. "But," suggested Lellie Bean, "the clergyman said we ought not to strive for too much earthly riches. He said we ought to lay up riches in heaven."

This, of course, we supposed to be very true, because the Bible said so; but it presented a knotty subject to us. Lizzie Carlton wanted to know what it meant to lay up treasures in heaven. She wondered what kind of treasures those were which thieves could not steal. We had heard the thing preached about a great many times; but we didn't understand it. In fact, we looked upon it as a misty, cloudy affair, which we might, perhaps, understand when we grew up, but which was entirely beyond our comprehension now.

While we were talking thus, Aunt Mary Dunn came into the room, with her knitting work, and took a seat near us. Of course she wasn't really an aunt to all of us, but then we all called her Aunt, for she was a good old woman, and we all loved her very much. Lellie went to her, and told her what we had been talking about, and then asked her what it meant to lay up treasures in heaven. Aunt Mary thought awhile, and finally told us that when we were commanded to lay up treasures in heaven, it did not mean that we should gather up a lot of earthly riches to pile away in the skies. She said we must not always think of heaven as a *place*, like some particular house, or some particular town, or some particular country; but we must look upon it as a state of existence, in which we could live even now, while we were good little children. And then she said that we must not think that these heavenly treasures were to be hoarded up, like the wealth of a miser; but they were for present use—they were for present enjoyment; they were to be used and enjoyed during our whole life.

This was something very curious to us, and we all felt that if we could gain such treasures as those, we should like them.

"I see," said Aunt Mary, "that you don't quite understand me; and I shall have to tell you a little story. But you must wait a minute."

With this she got up and went out of the room; and while she was gone we all gathered about her chair, for we loved dearly to hear her tell stories. When she came back she had her little morocco-covered Bible in her hand. It shut with a silver clasp, and on this clasp were engraved two names—one, MARY DUNN, and the other was the name of the giver, who had been dead a great many years. We knew the story of that book. It was the story of a true and faithful heart, and of a love that could not die. She sat down in the old chair again, and when she had opened the Bible, she took out from between its leaves a little moss-rose.

"Children," she said, "you have heard of treasures which cannot be taken from us; and I suppose you have heard of flowers which can never fade?"

"Certainly," we told her.

"But," she asked, "did any of you ever see a flower which could never fade, and which could never lose its fragrance?"

We were sure we never had.

And then she held up the little moss-rose, and told us that there was a fadeless flower, the sweetness of of which could never waste away.

This sounded very strangely to us, for surely the little rose was all faded and withered, and its leaves were dry and crisp; and we knew there could be no such fragrance exhaled from it as we could enjoy.

"You think," she said, with a smile, "that this flower is very far from being a blooming one; and I am going to show to you that the deepest and purest bloom, like the most valuable wealth, is not that which we can see with the eyes of the body—and, also, that the sweetest and most enduring fragrance is not that which we realise through the outer senses alone. Now just listen to my story:—

"Many years ago I lived in a town which is a great distance from here; and I had a very comfortable home; for my relatives, with whom I resided, were rather wealthy. I have told you how my father died when I was a little child, and how my mother followed him in a few short years; and I think I have told you how good they were, and what excellent lessons my mother taught me. I was living with my uncle at the time of which I speak, and had been keeping school through the winter and spring; but as I was not very strong, I meant to have the summer for a vacation. In fact, my uncle would have it so. He said I had done work enough to need rest, and that, if I wouldn't take it myself, he'd lock me up. Of course he said this playfully, though he was earnest in the matter, for I know he loved me just as he loved his own children. However, I made up my mind that I would take the rest without compulsion, and I planned to pass a very pleasant season.

"One day, in the latter part of June, as I was sitting in the hall, I heard a gentle rap upon the door, and when I went and opened it, I found a boy there with some strawberries, which he wanted to sell. They were the best looking ones I had seen that season—large, fair, and plump, and all very nicely shaped. After I had bought the berries I took notice of the boy. He had a bright-looking face, with a high forehead, and large, brilliant eyes, and his face was clean, too, but his clothes were very poor and very ragged, and I thought he looked sad and down-hearted. I felt interested in the lad at once, and I asked him if he belonged to the town. He said he did—that he lived only a little way from the village. 'But,' said I, 'you have never been to my school.' He hung down his head, and I finally drew from him that he could not go to school because he had nothing fit to wear. He was almost fifteen years old, and he had two sisters and two brothers younger than himself. He had no father, and his mother had to work very hard. His name was John Summerton. He told me where he lived, and then I let him go.

"I very soon made up my mind that I would call on this family. I had begun to tire of doing nothing but read, and sew, and help to take care of the house, for there were parts of my nature that were not used thus, and I thought that a visit to such a place might afford opportunity for additional enjoyment by opening a new field of labour. So, on the following day I went. I had supposed that I should find the family poor; but I was not prepared for such a scene of utter destitution as met my gaze. Mrs. Summerton was a pale, feeble woman, looking far older than she really was, and she had five children, John being the eldest, while the youngest was only six. The hut in which they lived was very small and shabby, and all the land they had was a little patch not so large as our front yard. I liked the looks of this poor widow the moment I saw her, for I could look beneath the miserable dress she wore, and I was sure that I could see a good woman. And I liked the looks of the children. Of John I have already told you. His two sisters were called Katie and Susie. The first was thirteen years old, and the other was ten. And they were pretty girls. They were very ragged, and their little feet and legs were bare, and their hair was burnt by the sun, and their skin was tanned, but they were pretty for all that, because they were bright and good, and I could see that they loved their mother. And the two little boys, who were younger still, were very pretty children, and did not behave at all rudely when I went by.

"As soon as I made the poor widow understand that I had come to help her if I could, she began to cry; but by-and-by she became calm, and told me her story. She said her husband had once been one of the best of men, and one of the most intelligent, but in an evil day he gave himself up a slave to the intoxicating cup, and in a few short years he died—died leaving his family in poverty and wretchedness. The widow struggled on, labouring hard to support her children, but at times she had almost failed. She had not begged herself, for she could not. Her little ones had gone out to ask for charity, but they had been sneered at so much that they were afraid to go any more. She got some sewing to do, and sometimes, when she was strong enough, she went out to wash clothes, and when the season was right, the children could pick berries and sell them; but from all this they realised but very little, and, when I thus found them, they were in great suffering. I asked around me, and I kissed them all. I told the widow that she must make herself as comfortable as possible until I came again. I had reached the door, and was just passing out, when she came and placed her hand timidly upon my shoulder, and asked me if she might kiss me. She couldn't speak her gratitude—she didn't dare to tell her love—but she wanted to kiss me—and when I wound my arms about her, and kissed her, and prayed that God would bless her, she wept aloud.

"I was now wholly absorbed in the work I had thus commenced, and I could not leave it. I went to the joiners and masons, and told them the same story I had told to others, and they finally fixed upon a day on which they would all go and put the widow's cot in good repair. In the meantime I sent that even my kind words had done them good. I went first to my uncle, and told him the whole story, and when I had made him understand it as I understood it, he told me to do as I pleased, and he would stand by me with his purse. But I did not mean that my uncle should do all. I went to those of my friends whom I knew to be able, and who, I thought, would assist me, and told my story over and over again, and before night I had collected so much food and clothing that I was obliged to take my uncle's horse and wagon to carry it all. Perhaps you can imagine how the eyes of the children sparkled when they saw the nice food and the good clothes, and perhaps you can imagine how the poor mother wept and sobbed in her gratitude. The little ones gathered the woman why she had not made her condition known, at the same time assuring her that there were many people in our town who would gladly have helped her. She said she did not dare to. She was afraid they would send her to the alms-house, and she could not bear the thought of having her children brought up there. She had worked on until her strength was almost gone.

"I talked with the mother until I had got her story, and then I turned to the children. John said he would willingly work if any one would hire him, and the others said they should like to go to school if they had anything to wear. When I went away I promised I would call again, and that I would send