EDISON'S LITTLE MEN.

WORKING THE KINETOGRAPH.

BY BARNET PHILLIPS.

ABOUT a twelvemonth ago I paid a visit to Mr. Thomas Edison at his laboratory in Orange, and he led me to a wooden box, and asked me to look into the inside of it through a narrow glass opening. I did so, when Mr. Edison started the machinery in the box, and what did I see? Why, a little man whom I remember reading about in the days of my childhood—a veritable little pygmy. There he was, sure enough. A figure about an inch high came out of a door. He took off his hat to me, and he danced for me, and he wheeled about and kicked and capered, and he wound up by bowing to me once more, then opened the door of his house, and disappeared.

"What might you call it, Mr. Edison?" I asked, delighted. "What's his name?"

"Oh, the apparatus?" said Mr. Edison. And he wrote down its name in his own hand, this way:

Kinetograph

T A Edison

"It is a kinetograph. Had enough of it?" he asked.

"Nothing like enough. Why, that is an old friend of mine. I should so like to hear him talk."

"We have thought that out long ago. I am not now quite ready yet to put the apparatus before the public, but by-and-by the kinetograph will record every gesture, while the phonograph will repeat whatever he may say."

Now if an ordinary person had said that to me in the same kind of airy way I might have been doubtful as to his success, but we all know that Mr. Thomas Edison is an extraordinary genius, so I took what he said as positive and conclusive. I was certain that in a short time the kinetograph would be perfected, and so it is to-day.

Look at these little illustrations carefully.

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The pictures, sixty-five of them, show a Scotch lad and lassie dancing a reel. In the No. 1 there is the beginning of it. Both figures are on their feet. They are not dancing yet. The introductory bars of the music, the bagpipes, have just started. Look at No. 3. The man has his left foot a trifle raised from the floor, but the woman has not. Her arms begin to rise in the Nos. 4, 5, 6, and 7, and the man is about turning. In the No. 10 he has struck his dancing gait. Necessarily he can't hop around on the same foot all the time, and so he is putting that foot on the floor, so as to get another spring. That foot comes to the floor in the No. 13.

The dancer is ready now to take his partner and to spin her round, and she shows that she is preparing for that. In No. 18, you will see what was at first but a slight bending of her knee becomes more marked than in No. 16. In Nos. 17 and 18 she is jigging it. No. 19 shows the turning round of the figures at its commencement. The scarf of the man in No. 18, as the movement is getting to be more rapid, is beginning to stream out. Do not forget to watch the shadows, because they vary all the time with the position of the figures.

In the No. 20 the positive change of place is marked. It is the man in No. 25 who has now his back to you. The lassie is hidden, all but her hand and wrist, where she has them on his shoulder.

From Nos. 27 to 40 the lady is coming more and more to the front. The man is now entirely to the right, and the woman to the left. They have changed places after 42. They are to resume their first positions. In the whirl, see the movement of the scarf of both the dancers. They dance faster and faster, until in No. 61 they are about as when they started. The spin is rapid, because the woman's skirt indicates that.

What the prints do not show are the shuffle of the feet of the dancers, and how they mark the time; the graceful sway of the figures, or how they rise and fall, following the musical rhythm; or how the feathers in the man's bonnet bob up and down; or the changing expressions on the faces of the lad and lassie.

Place the pictures in the Edison box, however; start the machinery, and the actual movement is all there. Man and woman caper away, heel and toe, and there is no flagging. It is just as vivid as if it were a performance on the stage and you saw it from the boxes.

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You must not be afraid of the explanation, and how the kinetographic pictures are made, and of the working of the machine.

The compound word "kinetograph" is derived from the Greek, and a fairly exact translation of this Greek would be a "movement record." Every movement we make is composed of many different movements. You hold your bat in your hand, and you hit the ball. But you who made the drive in a fraction of a second must know that the strike was brought about by ever so many movements. Not alone did you swing your arms: you gripped the bat with your hands; your shoulders, your head, neck, your legs, feet, your waist, and in fact the whole of your body went into action. Now this kinetograph insists in taking every one of your movements piecemeal and records them. It prints them, one by one, by means of the photograph.

The dancing figures make really only one turn in the reel, and there are 65 pictures of it. It took some time over a single second. The photographing apparatus Mr. Edison has invented catches 46 such pictures in a single second, and so these 65 prints took a trifle less time than a second and a half. If the photographing apparatus were to run for a minute, 2760 prints would be the resultant. Then each picture was impressed on a sensitive film in one-forty-sixth of a second. Think, now, how fast a band of paper or of anything else has to run in order to take impressions one after another! The band scurries along at the rate of fifty miles an hour. How easily things might snap or run off the track when going at such a high speed! Now do you think that is the end of it?

There is more than that. Here goes your band of paper or sensitive film as quick as a flash, and the camera is doing its level best. What would be the resultant? Nothing, only a long blur or smear of a picture that nobody could make out at all.

What the band does as it tears along is not to keep flying. It must stop at certain intervals, so as to give the camera a chance. Then it must start off at breakneck speed again. The shutter of the camera must be dropped and lifted, the latter when the band is at rest, and closed when the band is speeding. It is then a question of halting and starting, and that increases the speed of the band between the working points to a great degree.

27 28 29 30 31 32 33 34 35 36 37 38 39

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That was where Mr. Edison had the hardest work; but he is the most persistent of men, for he lives with the work he has in his brain, and having wrestled with it, he conquered what was an immensely difficult problem of mechanical motion.

Mr. G. P. Lathrop, who wrote about the kinetograph in HARPER'S WEEKLY, put it clearly in this way. You had a locomotive tearing along at fifty miles an hour, a speed sometimes made. But suppose you had to bring that locomotive to a halt 165,000 times in the hour? Some young readers have fathers who are engaged on railroads, and they will ask them what kind of a patent brake or starting machinery they would use under such circumstances.

This is the way Mr. Edison manages it. He has a disc, with four holes in it. The disc revolves rapidly, but stops at certain intervals, and so lets in or cuts off the light from the camera. The film runs along on two spools. The most absolute time must be kept of the revolving shutter and the band, a regularity of motion as exact as that of a chronometer. The sensitiveness of the film and the picture taken in $\frac{2}{127}$ of a second is one of the marvels of photography.

When the pictures in the illustration of this article are put in the machine and rolled before the eye at a proper speed, you retain in your vision their impression as a whole. They all blend, fuse, and you understand them as one perfect image.

Some of you may have seen the Muybridge pictures, and they were admirable. You had to examine the photographs separately. They were made by means of a number of photographing cameras. Each one picture came

40 41 42 43 44 45 46 47 48 49 50 51 52

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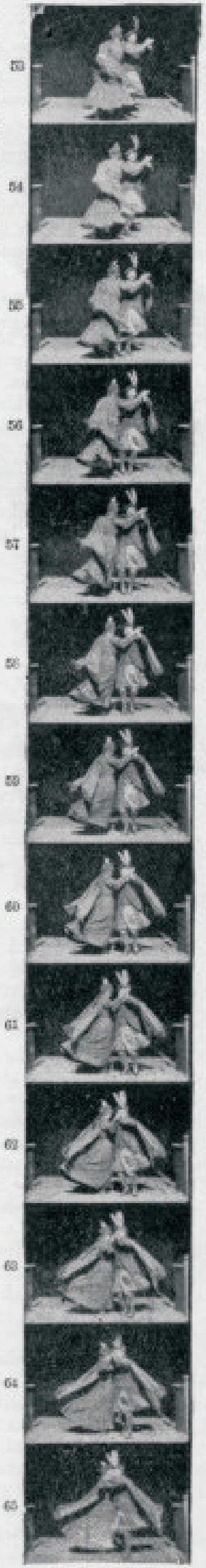
out separately, but there was a wide gap between the motions of the objects taken. They never could be comprehended as a whole. They were jerky. A jumping horse was not unlike a hobby-horse. When Mr. Edison's horse clears a barrier, he jumps all over as cleverly as if he were entered for a hurdle-race.

Here is something I want particularly to impress on the minds of my readers, young and old. There never was any invention which had not its use. To-day it may only amuse you. To-morrow it may be one of the great helps of life.

There is many an old reader of HARPER'S YOUNG PEOPLE, a university graduate, who remembers in his collegiate days the electrical machine as explained by his respected professor. It was an interesting toy, and the professor had no more idea of the vast stores of power in that apparatus than had the scholar. When the old gentleman turned the crank there was a feeble splutter of sparks. To-day it is a thousand horse-power steam-engine that moves the dynamo, and tremendous forces are evolved. What Mr. Edison has done in working up this kinetograph is to show how delicately accurate, to the thousandth part of a second, he can adjust electric force, for he uses electricity to run the whole picture-taking apparatus. Certainly no other force could accomplish this task.

It is the potentiality, or the possible power, or the possible use of any newly invented thing which must always be borne in mind. You never can tell what man, in the next year or in ten years, may do with it. I am quite certain, then, that some of my readers will live long enough to see for themselves how useful will become this kinetograph.



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