MY BOY.

A little crib in "mother's room,"
A little face with baby bloom,
A little head with curly hair,
A little woolly dog, a chair.

A little while for bumps and cries,
A little while to make "mud pies,"
A little doubting wonder when
A little pair of hands are clean.

A little ball, a top to spin,
A little "Ulster" belted in,
A little pair of pants, some string,
A little bit of everything.

A little blustering, boisterous air,
A little spirit of "don't care,"
A little tramping off to school,
A little shrug at woman's rule.

A little converse with Papa,
A little twilight talk with Ma,
A little earnest study, then—
A little council grave again.

A little talk about "my girl,"
A little soft mustache to twirl,
A little time of jealous fear,
A little hope the way to clear.

A little knowledge of the world,
A little self-conceit down hurled,
A little manly purpose new,
A little woman, waiting, true.

A little wedding gay at eve,
A little pang the home to leave,
A little mother lone at dawn,
A little sigh—my boy was gone!

—*Selected.*

LITTLE EXPERIMENTS.—MATTER.

BY SOPHIE B. HERRICK.

From the day that the first human being began to notice the world about him, we feel sure he must have wondered at the strange things he saw. A little baby tries to find out about the things it sees; it looks and examines; it feels and tastes; you see its little eyes follow the light; it turns its head at a sound. Something in this way it must have happened, ages ago, that men noticed and thought about things in the world around them.

The baby finds that the floor is hard, that sharp things prick or cut its little hands, that water is soft to the touch and delightful to splash in, that fire is hot and must not be meddled with; and so it goes on, getting better and better acquainted, day after day, with the world it has come to live in. The baby is really beginning to learn natural philosophy; it is studying, in its little baby way, the nature of matter.

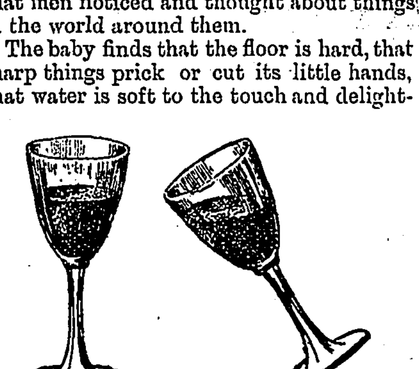

FIG. 1.

Matter is the general name given by men of science to the things that make up the world around us—such things, for instance, as those we can see and taste and handle. From the beginning, when men came on the earth, they studied in much the baby's way the nature of matter, only they carried on their study much more slowly, for they had no one to help them learn.

At first thought, it seems quite right to call hard things, like earth and stone and glass, matter, while liquids like water seem a little doubtful, and air does not seem as if it ought to have such a solid name at all. But air is quite as truly matter as is water or glass, only these three things are all in what is called different states or conditions of matter.

Glass is a solid, water a liquid, and air a gas. Suppose you take a lump of ice: it is is evidently matter in the same state as glass; it is hard and brittle and solid. If you had two clean blocks, one of glass and one of ice, standing side by side, and you were not allowed to touch them or to bring them into a warm place, you would find it hard to tell which was glass and which ice.

Now put two pieces, one of glass and one of ice, on the top of the stove; the glass does not change, but the ice at once begins to melt; it soon is entirely changed into its liquid form, water. The glass, too, would turn into a liquid, which could be poured like water, if you were only able to add heat enough. This is done whenever glass is made into solid shapes. It takes a great deal more heat to liquefy it than ice does.

Watch your ice; in a few minutes it boils violently and begins to go off in steam or vapor. The water is all gone, and the steam seems to be gone too, but it is not; it is in the air in a form you cannot see. Take another piece of ice, melt and boil it in the same way, only while the steam is passing away hold a cold china or metal plate just above it, and you will see it quickly turn back to water again. The condition of matter, you see, depends principally upon the cold or heat to which it is subjected. Most matter melts and even turns into vapor with enough heat. There are a few gases that have never been turned into a liquid or solid, and a few solids that cannot be melted; but ordinary matter can be put into the three states of matter—solid, liquid, and gaseous or vaporous. A solid bar of iron, by adding sufficient heat, can be turned into a liquid, and even into a vapor—iron steam it might be called.

Matter in either of these three states is made up of millions upon millions of tiny particles so small that they cannot be seen with the very best magnifying-glass. Take a lump of white sugar. You see how solid it looks, almost like a little block of white marble. Pound it with a hammer (in a piece of muslin to keep it from flying about.) First it will break up into sparkling crystals that under a little magnifying-glass, for which I paid thirty-eight cents, looked exactly like rock-candy. Pound it and rub it till it gets very fine, almost like flour. Fine as these particles look, they are coarse and large compared to those I am trying to tell you of, those that go to make up the sugar. Through a good magnifying-glass they still look like lumps of clear whitish stone. Drop this finely powdered sugar into a little clear water; it falls to the bottom and lies there, but soon disappears, and the water becomes as clear as ever. Particles of sugar are there in the water, as you can tell by tasting it, just as the particles of water making the steam were in the air, but they are so small that they do not even cloud the clearness of the water. And yet these tiny particles are supposed each one to contain many thousands of others. These tiny particles of which matter is made up are called by a queer hard name, molecules, and these again are made up of smaller particles called atoms.

You have no difficulty in telling an ordinary solid from a liquid or a gas. A stone is a solid; the particles that make it up hold firmly together. If you take hold of one part of it, you move the whole stone. A liquid is also made up of particles, and these particles lie very close together: but they do not appear to be connected firmly together; they slip over each other easily. Some materials are not perfectly liquid. Take molasses, and set it out in a very cold place; it becomes very thick, and pours with difficulty. Now put it in a warm place, and it will pour quite easily. At first it was something like a solid; now it is a liquid.

In order to get some sort of an idea what this liquid state is, let us make a little experiment (Fig. 1.) Take a quarter of a pound of shot of the smallest size. Each of these shot is a solid, but together they act very much like a liquid. Pour them into a small box; they run down, filling the lower part of the box, and coming to something like a level on the top, as water would. The shot slip and settle because they are round; but they do not slip easily, as the water particles do, because they are not perfectly smooth. You know how necessary smoothness is to slipping easily. You would never dream of going skating on a gravel path. The movement of these shot shows you somewhat how the liquid particles pour and slip and settle and take the form of the vessel that holds them. I have used a wineglass instead of a box to show you more plainly what I mean.

In a gas the particles not only slip over each other easily, but each particle seems to have the power of pushing the others away, sending them flying off. A gas, from this quality, always tries to expand, to spread itself, and occupy as much room as it can.

Between the molecules that go to making up different kinds of matter there are spaces. You may get a rough idea of this from the spaces between the shot. You know, too, how easy it is to squeeze out a sponge, or to mash together a piece of bread or cork. These things are full of large pores, into which water or air can get. Some solid bodies have pores too, only so small that they are empty. Even gold, which seems so very solid, will allow water to pass through it if subjected to a hard enough pressure. Some philosophers of past days tried an experiment which is very interesting. They made a hollow ball of gold, filled it with water, and closed it up with more gold. They then put it under heavy pressure. Water cannot be made much smaller than its usual size, no matter what is done to it. When it had been made as small as possible by pressure on the ball, it oozed through the solid gold, and stood like dew upon the surface of the ball. Most solids and liquids can be made a little smaller by pressure; but unless they are full of actual holes, like wood or cork or sponge, they cannot be made much smaller. All gases can be enormously decreased.

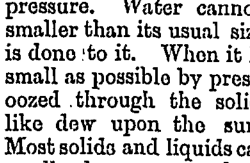

FIG. 2.

Take an ordinary piece of India-rubber used for an eraser, an ivory paper-knife if thin, a piece of whalebone or steel bone, or a piece of an old barrel-hoop; hold one end in your left hand, pull the other aside, and let it go. See how it springs back in place; that is because of the elasticity of the India-rubber, ivory, whalebone, steel, or wood, whichever you use. Pull an India-rubber strap, and see how it snaps back. Drop an India-rubber ball from five or six feet height upon a board which has been thinly oiled, and see the size of the spot removed by the ball (Fig 2). A: *a* is the size which the ball removes when laid upon the oiled board; *b*, when dropped from a height of two feet; *c* is the spot when bounced from about four feet above; *d*, the ball. B: *a* is the paint a glass marble took off when laid upon a board thinly smeared with wet paint; *b*, the size of the spot taken when the marble was dropped from a point five feet above the board; *d*, real size of marble. Now hold the board with the ball upon it up against the light. You see how tiny the place where the board and ball touch, how much smaller than the spot. Now we are beginning to get at the reason for the bouncing of India-rubber. When the ball strikes the board it hits it hard, it is flattened against the board. In trying to become round again, it pushes against the board and jumps up into the air. (Fig. 3.)

An ivory ball is flattened too, as you can find out by dropping one on an oiled piece of marble; and so is a glass marble (Fig. 4). I this moment tried it on a marble hearth—but do not oil your mother's white marble hearth or table to try this. Unless you can try the experiment without hurting anything, be satisfied with the rubber ball. The bounce is from exactly the same cause. Ivory does not flatten much, but it springs back sharply into shape; that is why ivory balls are used in billiards, because they are so sharply elastic. There are some bodies which have no elasticity, or very little. Drop a piece of dough or putty from a distance to the floor; it falls and flattens out, but does not bounce up a particle.

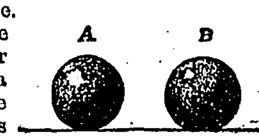

Fig. 4.
A, Marble standing on Slab.
B, Bounced and flattened.

There is one thing more that I want to tell you about matter, and that I wish you to think about and understand, or you cannot understand what comes after this. Part of it you know perfectly well already, but the other part will seem strange till you have thought about it carefully. Matter stays where it is put; it cannot move itself—that is the part you know. The other half of this truth is that if matter is set by some force into motion, it can never stop moving, or change its direction, or move more slowly, of itself. It will go on in the same direction and at the same rate forever. This is called inertia.

You know when you are running fast how hard it is to stop suddenly. Take a saucer or shallow tin plate out-of-doors, so as to do no mischief; fill it half full of water, hold it out level, and move your hand as far as it will go, holding the pan still as level and steady as you can, and moving it as swiftly; your hand comes to a sudden stop, and so does the saucer which you are holding tightly; but you have no hold on the water, and it shoots ahead in the direction in which your hand has been moving.

When you are in a carriage, or car, or ferry-boat which suddenly stops, you know how you are jerked forward. You are moving as the water in the saucer did. You would go not only much farther and much faster, but you would go on shooting ahead, without being able to stop yourself, except for a wonderful force that acts silently, but always throughout the universe, holding things steadily in place—the force of gravity.—*Harper's Young People.*

EVENING OCCUPATIONS.

BY MARIANA TALLMAN.

In a household where I was a chance guest not long ago, I was forcibly struck by the chronic barrenness of evenings which might have been enjoyably fruitful in amusement and instruction. There was the grandfather, whose eyes had long since forbidden him evening readings, dozing in his arm-chair, and waiting for bed-time. There was the daughter of the house, working with deft fingers at some dainty fancy work, and busy with her own thoughts. In the light of the shaded lamp, the mother sat, working always at her own never-ending "fancy-work,"—a basket of hose of various styles and sizes. Opposite was the stalwart son, seizing his opportunity for his only indulgence in literature after the day's labor,—and he always read books well worth reading, too. I could not help thinking that in his hand was the key which might have opened to this silent group a new treasury of delight. Was there any reason why the toiling mother, the infirm grandfather, and the pretty sister, might not listen with enjoyment to the "Conquest of Granada," and the "Tale of Two Cities?" A good book is doubly delightful, listened to in appreciative companionship; and, under its spell, the long evening tasks, that seem so irksome when regarded merely as tasks, come to seem only like indispensable accompaniments to the winter serial.

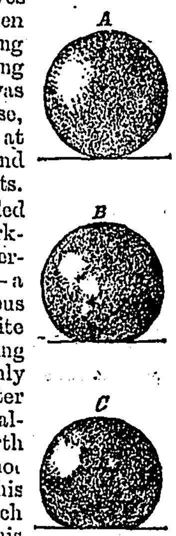

FIG. 3.
A, Rubber Ball standing on Board.
B, Dropped from height of two feet.
C, Dropped from height of four feet.

Why might not this method also serve to carry a family through some definite course of reading,—the Chautauquan, perhaps, or something even simpler? The authorities do not object, I believe, to information imbibed thus,—by ear, instead of eye,—

"Porvidin' you know what the facts is,
An' tell 'em off jest as they be."

as Will Carleton's committee-man has it.

You young folks who have hitherto unthinkingly absorbed rather than diffused knowledge, try my suggestion, and see if the tales and histories which linger longest and most lovingly in mind be not those you have read aloud or listened to in the companionship of your own household band, "round the evening lamp" of winter nights.—*Morning Star.*

HOW BABY LEARNS TO WALK.

When you see the baby walk
Step by step, and stumble;
Just remember, now he's here,
Both his wings are gone—Oh dear
Catch him, or he'll stumble!

When you hear the baby talk
Bit by bit, all broken,
Only think how he forgets
All his angel words, and lets
Wonders go unspoken!

—*St. Nicholas.*