

S.—If you were to press the six inches of air into three inches the pressure would be doubled. When the twelve inches were compressed into six the pressure on the half-inch rose from seven-and-a-half pounds to fifteen pounds, and if you compressed that into three inches the pressure should again be doubled. It would be thirty pounds on the square inch.

T.—Well reasoned. The cork would then fly with much greater force. And we would have to put it in tighter, so that it would not fly until the piston was pressed in the required distance. If the piston should be pressed in to within a distance of an inch and a-half from the cork before it flew, what would be the pressure on the half-square inch of cork?

S.—The pressure would have to be sixty pounds, if the law holds true in all cases.

T.—You are quite right. So you see that if one only put the cork in tight enough, and pressed the piston with force enough, the cork could be made to fly with as much velocity as one chooses.

S.—Could it be made to go as fast as if fired out of a gun?

T.—Of course it could; so that you see it is not at all surprising that Arthur's face should feel the impact unpleasantly.

S.—I did not think that air would give such a blow for it is the softest of all things.

T.—True, it is, when in the summer zephyrs it plays with the Aspen leaf, too weak to make anything else flutter. But it is otherwise in the storm, when it tears the branches from the oak and tumbles the giant hemlocks as you would a set of nine-pins. In the tornado the zephyr puffs with such velocity that bark may be scraped from the trunk of a tree, and straws may be shot into the wood as if they were arrows. And in the gun itself, what have we but a gas to deal with? For the powder is converted into a gas, which rushes with such velocity to make room for itself that it throws the bullet before it with irresistible force.

S.—And could air guns be made to fire bullets with as much force as powder?

T.—Your own experiments show that if the law you observed for a little distance holds true in extremer cases, that it must be so. In fact, there is nothing which can give harder blows than soft gas. Nitro-glycerine or dynamite, when exploded, merely passes into a state of gas nearly instantaneously, but the gas expands with such tremendous rapidity that it will puff solid rock away even if there is nothing above it except air, and if common air should in any manner be given the same velocity it would puff, blow or blast everything before it like dynamite.

In our next lesson we shall search for examples of compression and expansion of air in our winds and storms—compression and expansion produced by pressures. We will not have the winds confined in so convenient and simple a pen as our pop-gun tube, but what we have observed in our pop-gun pressures will be of some use to us.

### The Real in Education.

[Read before the York County Teachers' Institute, December 17th, 1897.]

I. "Education does not mean teaching people to know what they do not know. It means teaching them to behave as they do not behave. It is not teaching the youth the shapes of letters and the tricks of numbers, and then leaving them to turn their arithmetic to roguery, and their literature to lust.

It is a painful, continual, and difficult work, to be done by kindness, by watching, by warning, by precept, and by praise, but, above all, by example."—*Ruskin*.

A member of this Institute has given those words as a text.

They recall Burke: "What is the education of the generality of the world? Reading a parcel of books? No! Restraint and discipline; examples of virtue and of justice; these are what form the education of the world."

Some one might say: Yes; but we here mean merely intellectual education; we are teachers of the mind only.

Such a speaker would be put down in this Institute, sat upon in your minds, if not by your bodies. For we are all pretty well agreed, in theory at least, that human beings are complex creatures, that children's minds cannot be taken out, cleaned, and arranged just as the mental surgeon may wish, after the fashion of his up-to-date physical brother, with our stomachs. We are all pretty well agreed that the teacher is *in loco parentis*, and therefore that he is, in school, to think not only of so many mental machines before him, but of so many responsible beings; in old-fashioned, New Testament language, of so many souls. It is true that mental knowledge is the chief, if not the highest, object of the school. But to whom or to what are you going to give it? to a being of so much heart and feeling, of so much self-will and passion, of so much lightness—good and bad—that one could even despair of training it mentally, at all. Evidently to abstract the child's mind from the rest of him is impossible.

And does he not come to school himself with the unconscious consciousness of this? With what heartiness he often sets off at first; with what good-will he begins to work; how uncertain and unsettled, but how interested; how quick to make friendships, too, and to form new ties; how social, even in his work; how ready, if well brought up so far, to respond to his teacher, if he or she also be made of good stuff, and, we add, be able to show himself for what he is. Ah! there is the beginning of sadness—the misunderstandings, the misjudging, the weariness of mind or of heart, the coldness on one side, the hard dulness on the other. We must escape from all that just now to the ideal, which is also the real. For who will deny that we are helped by even