

### On Accidental Discoveries.

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(Continued from Page 207.)

Sir Francis Palegrave in his "Merchant and Fizar," amusingly represent the good Abbot as scouting the idea that the *shape* had anything to do with the marvellous effect which a certain lens was discovered to have on the vision of the short-sighted young Emperor. According to the notion of the age, it was simply the innate *virtus* of the transparent gem of which the lens was composed that produced the result.

The defect of sight arising from the approach of old age, calls of course, as we all know, for a lens of the reverse shape of that required by the short-sighted. The construction of such a lens may readily have been suggested by noticing the magnifying power of a drop of water, or a globule of clear glass. A lens of this description once made, and used in frames for the correction of vision, soon led to important combinations.

An ingenious lad—the son of a spectacle-maker at Middleburgh in Holland—takes it into his head to look through two of these convex lenses at once, varying the distance between them by means of his two hands. He observes that the vane on the church steeple is brought wonderfully close to his eye—but that the image seen is reversed. The casual circumstance gives birth to a noble progeny of inventions. Here is the rudimental germ of the Telescope, the Microscope, the Camera for various purposes.

When Lawrence Koster, at Haarlem in 1430, let fall on a piece of paper the fragment of beech bark on which he had playfully cut in relief the initials of his name, little dreamed he as the stain produced by the moist sap first attracted his attention, what a revelation had been made to him, and through him to the world. Metal types and the art of printing thus had their beginning.

Bradley, the celebrated astronomer, (1748), is amusing himself with sailing on the Thames in a pleasure boat: the wind is blowing strongly; frequent tacks are made; he notices that at every turn of the boat, the vane at the mast-head, instead of keeping steadily in the direction of the wind, exhibits an uncertain sort of motion. By a train of reasoning he arrives at an important conclusion on the subject of the aberration of light, starting a theory that has relieved astronomers from a perplexity under which they had previously laboured.

M. Malus, a French Colonel of Engineers, (1810), casually turning about in his hand a double refracting prism, as the sun is setting, observes one of the images of a window in the Palace of the Luxembourg disappear—and it leads him to the discovery which has rendered his name distinguished, of the polarization of light by reflection.

We might narrate how friction on amber originated the science and name of electricity—how experiments with jet, with sealing wax and India Rubber, might lead to the same result—how Louis Galvani, (1737) at Bologna, by taking notice of the spasmodic action of the legs of dead frogs when touched by his electrically-charged scalpel, discovered that phase of electric science that retains his name—how Maso Finiguerra, (1450) at Florence, while working at his business as an annealer of gold and silver, discovered the art of engraving on copper-plates, so as to obtain impressions on paper therefrom—how Louis Von

Liegen, (1643)—or, as some say, Prince Rupert—invented the process of mezzotint, by observing the corrosion of rust on a gun-barrel—how Alonzo Barba at Potosi, (1640,) happening to mix some powdered silver ore with quicksilver—with the view of fixing, if possible, the latter substance—found all the pure silver of the ore absorbed by the quicksilver, and so arrived at the secret of forming amalgam—how the casual observation of Francis Joseph Gall, (1757,) while yet a boy at school—to the effect that those of his companions who had prominent eyes had facility in remembering words—led at last to his curious theory of phrenology—how M. Argand, by perceiving a draught created by the passing of the neck of a broken bottle over a flame, was led to invent the well-known Argand Lamp—how M. de Courtois, (1813,) by accident detected iodine in sea-weed, from which material, since his time, it has been extensively manufactured.

These, and other equally interesting examples of happy discoveries by accident, I might narrate at length; but, I hasten to speak of the steam-engine, whose history presents us with several anecdotes in point. With these I shall conclude.

And first, the Marquis of Worcester, [1650,] while a political prisoner in the Tower, conceives from the dancing motion of the cover of the vessel in which he is cooking his dinner, the idea of a piston driven by steam—an idea that results at last in the perfect engine of James Watt.

Then Capt. Savery, (1680,) flings into the fire a wine-flask from which he has just removed the contents; he perceives that steam is generated by a few drops which remain in it. Something prompts him at this moment to snatch it from the fire, and to plunge its neck into a bowl of water; the water rushes up into the body of the flask, a partial vacuum having been created therein. This leads him to the construction of the engine known by his name, useful for raising water from small depths.

Again, up to the time of Newcomen, (1705,) the condensation of the steam within the cylinder was effected by the external application of cold water. He observes on one occasion that the piston continued its movements after the external application had ceased; and the cause of this he finds to be a jet of water entering the cylinder through a small aperture which had escaped his notice. A well-known simplification of the engine is the consequence.

Lastly, the boy Humphrey Potter, set to open and shut the steam-valves, contrives by means of strings to make the working beam supply his place; thus originating arrangements by which the beam is made to execute several secondary offices.

The discoveries to which I have alluded, I have spoken of as accidental. This is a phraseology which we rather unreflectingly employ. Doubtless, all the capabilities of things—the agreeable as well as the useful—are intentional. They have existed from the beginning, and have been designed for the good of men; and when an individual is so fortunate as to detect any one of them, he is simply fulfilling the Divine will.

On looking back over history, I think too we can discern, in the case of several important discoveries at least, that the moment of their occurrence has not been utterly accidental. When the mariner's compass was invented, it was soon to be required. Columbus, Vasco de Gama and Cabot lived in the next age. When Lawrence Koster saw his initials impressed on paper from the piece of beech-bark, the intellect of the fifteenth century was heaving, fermenting—struggling for some means of embodying and circulating its aspirations, more rapid, more universal than the reed of the solitary scribe.