gas works are a sort of magical Saving's Bank, in which commercial nothings are put in, and valuable something taken out.*

Mr. Brokeden has taught us how to make pencils out of dust. Our black lead pencils, as is pretty generally known, are made chiefly from Borrowdale plumbago, brought from a mine in Cumberland. This mine is becoming exhausted; and a question has arisen how the supply shall be kept up. Various compounds have been suggested in different quarters, but Mr. Brokeden has happily hit upon an expedient which promises wonders. Although pieces of plumbago are scarce, plumbago dust is tolerably plentiful, and Mr. Brokeden operates upon this dust. He presses a mass of the powder together, then draws out the air from beneath the particles by means of an air pump, and then presses again with such enormous force as to convert the mass into a solid block, which can be cut into the oblong prisms suitable for pencils.

If a ton of lead contains three ounces of silver—one ounce in twelve thousand ounces—will it pay to dig out this silver, mechanically or chemically? Will it save a penny? Mr. Pattinson, a manufacturing chemist at Newcastle, says, and shows that it will; although, before his improvements were introduced, the attempt was a losing one, unless the lead contained at least twenty ounces of silver to the ton. Nearly all lead ore contains a trace of silver, which becomes melted and combined in the ingot or pig of lead. Vast are the arrangements which the manufacturers are willing to make to extricate this morsel of silver from the mass in which it is buried; huge furnaces, and melting vessels, and crystallizing vessels are provided, and elaborate processes are carefully conducted. The lead, itself, is all the better for losing its silvery companion; while the silver makes its appearance afterwards in the form of dazzling tea-services, and such like.

The mention of Newcastle calls to mind our opening paragraph, relating to a certain table-land of refuse. The history of this useless product carries with it the history of many other remarkable products—once useless, but now of great value. Thus it is. Sulphur is thrown into a "burning, fiery furnace;" it burns away and is converted into a gas called sulphurous acid; this, being combined with steam and water, becomes liquid sulphuric acid. So far good; there is no refuse. But let us go on. Common salt, or rather rock salt from Cheshire, is heated with this sulphuric acid in a furnace. A peculiar penetrating gas rises, which is muriatic acid; the soda makers (of whom, more presently,) did not want this troublesome gas, and they, therefore, sent it up aloft through the chimneys. But the gardeners and farmers all around complained that the muriatic acid vapours poisoned their trees and plants, and then the manufacturers were driven to construct chimneys so lofty as to overtop our loftiest steeples in order to carry away the enemy as far above the region of vegetation as possible. But good luck or good sense came to their aid; they devised a mode of combining the gas with water, and thus was produced muriatic acid or spirits of salts; and then this muriatic acid was made to yield chlorine, and the chlorine was made to form an ingredient in bleaching powder; so that by little and little, the once dreaded muriatic acid gas has become a most respectable and respected friend to the manufacturer. Meanwhile the salt and the sulphuric acid are undergoing such changes, by heatings and mixings of different kinds, that they both disappear from the scene; the useful product left behind is soda, so valuable in glass-making, and soap-making, and other processes; the useless product is an earthly substance, consisting of calcium and sulphur, which nobody can apply to any profitable purpose, nobody will buy, and nobody even accept as a gift. At a large chemical work near Newcastle, this product has been increasing at such a rapid rate that it now forms a mass six or eight acres in extent, and thirty or forty feet high: it is a mountain or rather a table-land of difficulties. Here then, we see how chemical manufacturers are saving a penny out of some of their refuse, and looking wistfully towards the day when they may perchance save a penny out of this monstrous commercial nothing.

Coal proprietors are, perhaps necessarily, very wasteful people. They accumulate around the mouths of their pits large heaps of small coal, which, formerly, rendered service to no one; and in some parts of the country they burn this coal simply to get rid of it. But, thanks to the Legislature, it sometimes does good by interfering in manufacturing affairs. It ordained that locomotives should not send forth streams of smoke into the air, and we are thus freed from a nuisance which sadly affects our river-steamers and steamer-rivers; while, at the same time, coke being used as a non-smokable fuel, and the supply from the gas-works being too small, coke-makers have looked to the heaps of small coal at the pit's mouth; and the result is, that thousands of locomotives are now fed with coke made from the small waste coal at the collieries. The railway companies get their coke cheaper than formerly; the coal owner makes something out of a (commercial) nothing; and the ground around the coal-pits is becoming freed from an incumbrance. And what the coke makers would leave, if they leave anything, the artificial fuel makers will buy; for in most of the patent fuels now brought under public notice, coal-dust is one of the ingredients.

How to get a pennyworth of beauty out of old bones and bits of skin, is a problem which the French gelatine-makers have solved very prettily. Does the reader remember some gorgeous sheets of coloured gelatine in the French department of the Great Exhibition? We owed them to the slaughter-houses of Paris. Those establishments are so well organized and conducted, that all the refuse is carefully preserved, to be applied to any purposes for which it may be deemed fitting. Very pure gelatine is made from the waste fragments of skin, bone, tendon, ligature, and gelatinous tissue of the animals slaughtered in the Parisian abattoirs; and thin sheets of this gelatine are made to receive very rich and beautiful colours. As a gelatinous liquid, when melted, it is used in the dressing of woven stuffs, and in the clarification of wine; and, as a solid, it is cut into threads for the ornamental uses of the confectioner, or made into very thin white and transparent sheets of *papier glacé* for copying drawings, or applied in the making of artificial flowers, or used as a substitute for paper on which gold printing may be executed. In good sooth: when an ox has given us our beef, and our leather, and our tallow, his career of usefulness is by no means ended; we can get a penny out of him as long as there is a scrap of his substance above ground.

Dyers and calico-printers, like manufacturing chemists, have frequently accumulations of rubbish about their premises, which they heartily wish to get rid of at any or no price: and at intervals, by a new item added to the general stock of available knowledge, one of these accumulations becomes suddenly a commercial something. The dye material called madder will serve to illustrate this as well as anything else. Madder is the root of a plant which yields much colouring matter by steeping in water; and after being so treated, the spent madder is thrown aside as a useless refuse. The refuse is not rich enough for manure; no river conservators will allow it to be thrown into a running stream; and the dyer is thus perforce compelled to give it a homestead somewhere or other. But, some clear-headed experimenter has just found out that, actually, one-third of the colouring matter is left unused in the so-called spent madder; and he has shown how to make a pretty penny and an honest penny out of it, by the aid of certain hot acids.

* See also an article headed Gas Perfumery, in volume 3, page 331 of this Miscellany.