Science and Art.

Sours or Acids.

The sourness of the juice of a lemon and the acidity of vinegar are so well known that the mere mention of them is sufficient to convey a knowledge of the chief qualities of sours or acids in their natural state. There are so many acids that two or three pages of an index to a chemical book are taken up in enumerating them. Every fruit contains an acid; nearly all the metals are capable of forming acids. When coal, wood, paper, rag, charcoal, brimstone, phosphorus, and many other substances are burned, acids are produced. A flint stone is an acid. There is an acid in our window glass, and in many of the most costly precious stones. The air we breathe contains an acid. We create an acid in the lungs by the act of breathing. By a very slight change sugar can be converted into oxalic acid, which is a strong poison. Sugar, by another change, is converted into vinegar. These two illustrations show that a sweet can be converted into a sour; but when sour fruit becomes sweet it proves almost to demonstration that a sour can become a sweet acid.

The most powerful acid is that derived from burning sulphur—it is called sulphuric acid, and is one of the most important articles of manufacture. Its acidity is so great that a tea-spoonful is sufficient to make a pailfull of water quite sour. Nitric acid, obtained from niter, or saltpeter, is of the next importance in the arts; it is so corrosive that it has long been distinguished by the name of *aqua fortis*, that is, strong water—strong, sure enough, for a nodule of iron, lead, or silver, dissolves in it like sugar placed in water. From the number of acids which we find in nature, and the tendency of many artificial substances to become sour' it is evident that acids and sours are essential to our life and well being. Acids assume all forms and colors; some are liquids, some gaseous, others solid. The acids of fruits, when separated from the grosser particles that accompany them, are very beautiful and crystalizable substances. By the ingenuity of the chemist the sour of unripe apples grapes, tamarinds, lemons, &c., may be crystalized into beautiful snow-white bodies, which, however, when touched by the tongue, at once indicate their origin by their flavor.

SEPTIMUS PIESSE.

Coal Mines Lighted with Gas.

Some months ago we noticed an ingenious suggestion made by Mr. Septimus Piesse for illuminating mines by means of coal gas. This suggestion has lately been acted upon in Mr. Ackroyd's pits in Yorkshire, and the experiment has been so successful that the general adoption of this improvement is anticipated throughout the mining districts of the West Riding, of Yorkshire, England.

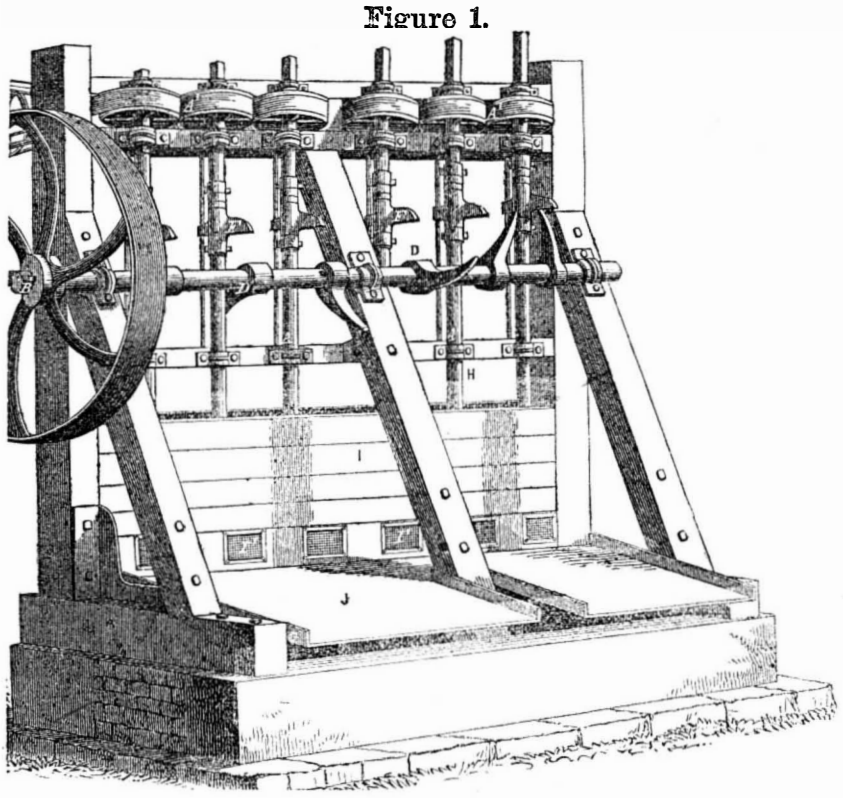
Improved Gold Amalgamator and Quartz Crusher.

Our engravings illustrate the inventions of Mr. Samuel Gardiner, Jr., of No. 212 Broadway, New York City. Figures 1 and 2 exhibit the quartz crusher, and fig. 3 the amalgamator.

In fig. 1 there is a long box, I, into which the gold bearing quartz is thrown, in lumps, to be crushed or pounded up into fine dust. The crushing is done by means of a row of pestles or stampers, and mortars placed within the box, I. A are the stampers, furnished at their upper ends with pulleys, A', by which they are rotated; at their base (fig. 2) they have heavy stamp heads, C, and chilled plates set into the mortars, E. The stampers, C', which are lifted by means of the cams, D, on shaft B. When B revolves, the cams, D, meet the projections, F, on the stampers, lift and then drop the latter. The operation is one of great rapidity; the stampers each weigh with their heads 650 lbs., so that their crushing power is very great. The quick revolving motion given to the stampers, at the same time that they rise and fall, tends to grind the quartz, and assist the pulverization. A constant stream of water flows into the box, I, which escapes and carries with it the quartz as fast as it becomes sufficiently pulverized, through the

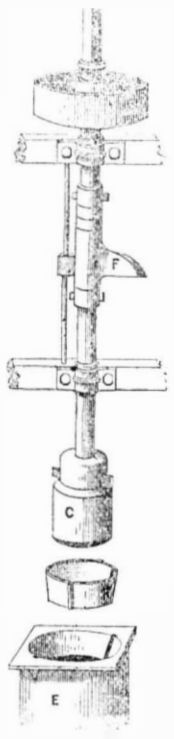
IMPROVEMENT IN GOLD SEPARATING MACHINES.

Figure 1.



gauze apertures, or sieves, I', on to he inclined plane, J.

Figure 2



From the inclined plane, J, the quartz dust and water is conveyed to the amalgamator (fig. 3,) entering through the inclined spout, H, and falling upon the amalgamating rollers, *d*, and from them upon the larger amalgamating rollers, D. B B' are troughs containing quicksilver, in which the rollers, *d* D, respectively rotate, and thus have their surfaces kept continually coated with mercury; the quartz water is thus doubly brought into contact with the quicksilver, and complete amalgamation takes place. Below the machine is an inclined plane, K, called the ripple box, upon which the water falls, after leaving the lower cylinders. Should any gold remain in the water it will be arrested by the pockets in K.

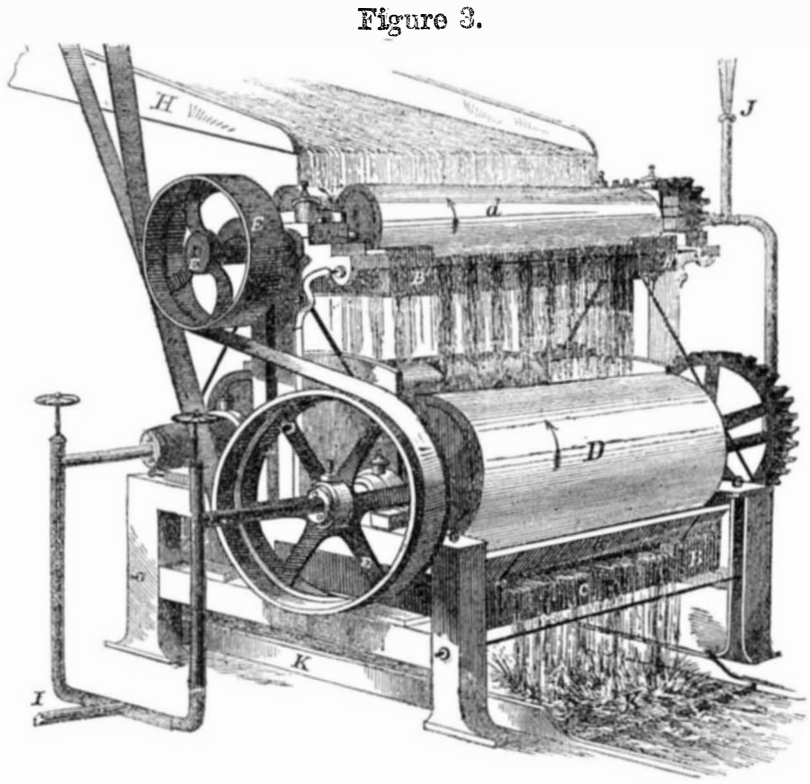
The large cylinders, D, are hollow, and heated by means of steam introduced through their journals from steam pipe I. The effect of the heat is to render the mercury more active in amalgamating with the gold. If heated to 212°, the mercury will absorb five times more gold than at 60°. This shows the importance of warming the cylinders. We do not remember to have seen any other amalgamating machine in which practical advantage is taken of the above mentioned property of quicksilver.

We are told that the quartz dust can be exposed to over 6000 square feet of quicksilver surface per minute, in one of these machines; this is on a calculation of 40 revolutions per minute for the large cylinders, and includes the surface presented by the quicksilver in the troughs, while the quartz water passes through the same. The ore and water pass between and under the cylinders in a thin sheet, which is regulated by a set screw: this also gauges the amount of ore desired to pass through the amalgamator. Ten tuns of ore, it is said, can be amalgamated per day by a single machine.

The crusher, with six stampers, we are informed, will reduce a tun of quartz per hour. The revolving motion of the stamper heads causes them to wear evenly; when too much worn they may be taken off, each separately and a new one put on, without stopping the machine; each stamper is arranged independently of the others.

The inventor states that this invention has been thoroughly tested at the mines, and operates with great economy and superiority. Full sized machines may be seen in operation at the Morgan Iron Works, in this city. Further information can be had of the patentee. Patented July 25, 1854.

Figure 3.



Gas Tar for Manure.

A Mr. Atkinson, near Durham, England, has recently been experimenting with coal tar on potatoes. The tar was mixed with manure for some time before it was applied, and the crops produced were excellent. We would not, however, advise any of our farmers to use coal tar with their manure on fields, until they have made full experiments for themselves. We allude to this at present, because this is the period when many farmers commence experimenting for the season with manures.

Fish with Legs.

The Rochester *Union*, N. Y., states that Dr. Langworth, of that city, has obtained specimens of fish with four legs from a stream of water near Fort Defiance, in New Mexico.—They are about seven inches long, and resemble a young codfish; the legs are like those of an alligator. They have been sent to Professor Agassiz, at Cambridge, Mass.

A considerable quantity of cork oak acorns were imported this season by the Patent Office and distributed in the Middle and Southern States. These acorns are from the south of France.

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